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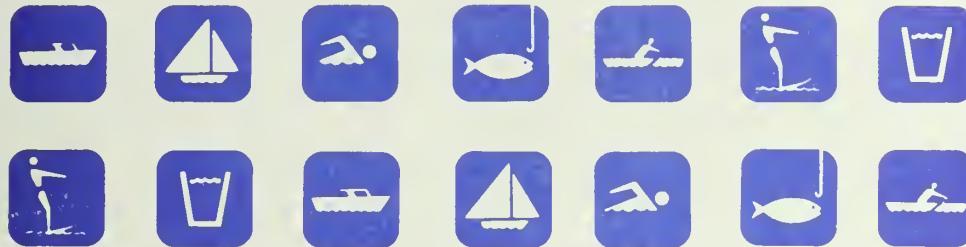
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ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF WATER POLLUTION CONTROL
2200 CHURCHILL ROAD
SPRINGFIELD, ILLINOIS 62706



1981 VOLUNTEER LAKE

MONITORING PROGRAM REPORT

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1981 VOLUNTEER LAKE MONITORING PROGRAM REPORT
FOR
LAKE TAYLORVILLE, CHRISTIAN COUNTY, ILLINOIS

A Cooperative Citizen -
Illinois Environmental Protection Agency
Project

May, 1982
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706

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This is one of 87 reports prepared for lakes in the 1981 Volunteer Lake Monitoring Program. It represents the coordinated effort of many individuals.

Illinois EPA's Ambient Monitoring Unit, Planning Section, Division of Water Pollution Control, under the direction of Kenneth R. Rogers, was responsible for the design and implementation of the program, as well as preparation of this report. Substantial assistance was provided by the Agency's Public Participation Section supervised by Gloria Craven.

Program coordination was provided by Donna Sefton for the Illinois EPA's Ambient Monitoring Unit and Carol Beim for the Public Participation Section.

Volunteers were trained by Public Participation Coordinators Carol Beim, Bob Hagele, William Hammel, Patrick McCarthy, Vanessa Musgrave, and Dawn Wrobel. Lake maps were prepared by J. W. Hammel and Bob Hagele. Lake assessment summaries were prepared by Patrick McCarthy.

Assessment and monitoring information was provided by approximately 140 volunteers throughout the state.

Data handling was performed by John Little, Jill Hardin, Marilyn Budd, Lori Whalen, Cora Stockton, and Karen Janssen. Data analyses were performed and tabular and graphical outputs obtained by John Little using programs developed for the Tektronix desk top computer terminal by Dr. David J. Schaeffer and Vladimir Chernomordikov.

Donna Sefton, Howard Essig, John Little, John Lesnak, Carol Beim, and Bob Hagele wrote portions of the lake reports. Reports were edited by Planning Section and Public Participation staff, particularly Marilyn Budd and Mary Anderson. The contributions of Robert Clarke and Thomas Davenport are recognized.

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INTRODUCTION

A cooperative volunteer lake monitoring effort was initiated by the Illinois EPA in 1981 as part of an overall self-help, service program being developed for lakes. In addition to expanding the Agency's lakes data base with information on present water quality and trends, the program was designed to involve citizens in learning about a lake so they could make more informed decisions regarding its use, protection, and enhancement.

Citizens selected a lake they were concerned about and were trained to measure water clarity or transparency by recording the depth to which a Secchi disc (an eight-inch diameter metal plate painted black and white in alternating quadrants) was visible. They also measured total depth and recorded field observations from a boat at three sites on their chosen lake. Readings were to be taken twice a month from May through October and reported to the Agency on special data forms. The Secchi disc, data forms, and postage paid envelopes were provided by the Agency. Volunteers were required to have a boat with an anchor to perform the monitoring.

Approximately 140 volunteers participated in monitoring 87 lakes in 1981. The sampling data were computerized to facilitate analyses and preparation of tables and graphs for reports. A statewide report entitled "Volunteer Lake Monitoring, 1981", summarized all the data for the volunteer lakes. Individual reports were also prepared for each of the 87 lakes monitored by volunteers in 1981.

BACKGROUND

Lake Taylorville is a 1,148 acre impoundment owned by the City of Taylorville, Christian County, Illinois. The lake, which was constructed by the damming of the South Fork of the Sangamon River, Locust Creek, Cotton Creek, and Cottonwood Creek in 1960-1962, has a maximum depth of 19 feet, an average depth of 7 feet, and a storage capacity of 7,914 acre-feet (Table 1).

Lake Taylorville serves as a potable water supply for the City. Recreational uses include powerboating, waterskiing, camping, fishing, picnicking and waterfowl observation. Access is unlimited.

The 84,032 acre watershed of Lake Taylorville is estimated to be 83 percent row crops. The lake shoreline is primarily grassland.

Suspended sediment and deposition of sediment are considered substantial problems for Lake Taylorville. Water level fluctuation is considered a moderate problem. Urban storm drainage, cropland runoff, fertilizer or pesticides from lawns/golf courses, waterfowl and sediment in the lake are cited as pollution sources.

Assessment information for Lake Taylorville was provided by Water Superintendent Joe Marucco, and the Illinois State Water Survey.

TABLE 1. LAKE ASSESSMENT SUMMARY, LAKE TAYLORVILLE, CHRISTIAN COUNTY, ILLINOIS (RE-A04-C).

I. GENERAL INFORMATION

River Basin: Sangamon
Segment: A04

Ownership: City of Taylorville

Surface Area (Acres): 1148
Watershed Area (Acres): 84,032
Maximum Depth (Feet): 19
Average Depth (Feet): 6.9
Storage Capacity (Acre/Feet): 7914*
Inflowing Stream(s): So. Fork Sangamon, Locust Cr.
Outflowing Stream(s): So. Fork Sangamon
Water Retention Time: 0.126*
Lake Type: dammed stream
Year Constructed: 1960 - 1962

II. USAGE

Public Access: Yes

Lake Usage:

Potable Water Supply: moderate
Industrial Water Supply: none
Agricultural Water Supply: none
Cooling Water: none
Recreation:
 Fishing: moderate
 Swimming: light
 Power Boating: heavy
 Row Boating or Canoeing: light
 Sailboating: light
 Camping: heavy
 Picnicking: moderate
 Waterfowl Hunting: light
 Waterfowl Observation: moderate
 Other: waterskiing - heavy

Recreational Facilities:
beach, picnic areas, campgrounds,
boat launch, concessions

Shoreline Usage (Percent):

Urban (Including Streets): 5%
Residential (Including Lawns): 10%
Golf Courses: 10%
Pasture or Grassland: 55%
Woodland: 10%
Row Crops:
Wetland: 10%
Other:

Watershed Usage (Percent):

Urban:
Residential:
Golf Courses:
Pasture or Grassland: 8%
Woodland: 6%
Row Crops: 83%
Wetland:
Other: 2%

III. WATER QUALITY AND PROBLEMS

General Water Quality: poor
Fishing: fair
Conditions and Extent:
 Suspended Sediment: large
 Deposition of Sediment: large
 Algal Blooms: minimal
 Aquatic Weeds: minimal
 Taste and/or Odor: slight
 Water Level Fluctuation: moderate
 Fishkills: minimal
 Other:

IV. CAUSES OF WATER QUALITY PROBLEMS

Potential Pollution Sources:
 Sewage Treatment Plant Effluent:
 Industrial Discharge:
 Urban Storm Drainage: yes
 Septic Tanks: yes
 Pasture or Grassland Runoff: yes
 Cropland Runoff:
 Feedlot Runoff:
 Construction Site Runoff:
 Fertilizer or Pesticides from
 Lawns/Golf Courses: yes
 Orchards:
 Forestry Operations Runoff:
 Mining:
 Waterfowl: yes
 Sediment in Lake: yes
 Other:

V. LAKE MANAGEMENT

Comments: in last six years have constructed
silt dams and rip-rapped some of the shore line.

Monitoring was performed by the Taylorville Water Department. Secchi disc depth, total depth, and field observations were recorded at three sites (located in Figure 1) on twelve days in 1981.

RESULTS AND DISCUSSION

In this section, monitoring results will be presented for the lake and compared to those for other lakes in the volunteer program. Then spatial (within lake) and seasonal differences in transparency will be examined and related to field observations. Results will also be discussed in terms of lake uses. For an explanation of unfamiliar terms or concepts presented here, refer to the report "Volunteer Lake Monitoring, 1981", Section IV "Understanding Illinois' Lakes."

The Secchi monitoring data for Lake Taylorville are summarized in Table 2 and plotted in Figure 2. Total depth data are provided in Table 3, while field observations are summarized in Table 4.

Transparency of Lake Taylorville

The average Secchi disc transparency of Lake Taylorville was 8.6 inches, which ranked number 83 when the average transparencies of the volunteer lakes were ranked from clearest (number 1 at 137.8 inches) to least transparent (number 87 at 7.3 inches). This average transparency was less than the four feet minimum recommended for swimming by the Illinois Department of Public Health (1976) and was in the range generally associated with use impairment problems in Illinois lakes. Above average rainfall during summer 1981 may have resulted in lower than normal transparencies.

Spatial and Seasonal Differences in Transparency

The Secchi disc transparency of Lake Taylorville ranged from a minimum of 1 inch at Site 3 on June 12 to a maximum of 19 inches at Site 1 on May 7. Secchi readings were below the four feet minimum recommended for swimming at all three sites on every sampling date.

As is typical of Illinois reservoirs, a spatial trend of increasing transparency from the lake headwaters to the dam was apparent in Lake Taylorville. The average transparencies of Sites 3, 2 and 1 (headwaters to dam) were 6.5, 8.6, and 10.6 inches, respectively.

The lake was extremely turbid throughout the May - October sampling. Lowest transparencies were found in late spring and early summer, and were the result of large amounts of suspended sediment caused by heavy rain, which fell during this period.

Field observations indicate that the lack of transparency was primarily due to the presence of suspended sediment, particularly at Site 3. This sediment load tends to settle out in the upper end of the lake so that

FIGURE 1
LAKE TAYLORVILLE
CHRISTIAN COUNTY



TABLE 2

SECCHI DISC TRANSPARENCY (INCHES) TAYLORVILLE/CHRISTIAN COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

| DATE | SITE 1 | SITE 2 | SITE 3 | MEAN | STD DEV |
|--------|--------|--------|--------|------|---------|
| 05/ 7 | 9.0 | 14.0 | 10.0 | 14.3 | 4.5 |
| 05/ 20 | 4.0 | 2.0 | 2.0 | 2.7 | 1.2 |
| 06/ 12 | 3.0 | 2.0 | 1.0 | 2.0 | 1.0 |
| 06/ 24 | 8.0 | 4.0 | 2.0 | 4.7 | 3.1 |
| 07/ 7 | 13.0 | 11.0 | 6.0 | 10.0 | 3.6 |
| 07/ 23 | 12.0 | 10.0 | 6.0 | 9.3 | 3.1 |
| 08/ 4 | 10.0 | 9.0 | 6.0 | 8.3 | 2.1 |
| 08/ 19 | 10.0 | 8.0 | 6.0 | 8.0 | 2.0 |
| 09/ 8 | 12.0 | 10.0 | 8.0 | 10.0 | 2.0 |
| 09/ 22 | 12.0 | 10.0 | 9.0 | 10.0 | 2.0 |
| 10/ 6 | 12.0 | 11.0 | 11.0 | 11.3 | 0.6 |
| 10/ 22 | 12.0 | 12.0 | 12.0 | 12.0 | 0.0 |

*****SUMMARY STATISTICS*****

| SITES | LAKE |
|----------|------|
| MEAN | 10.6 |
| STD DEV | 4.2 |
| MIN | 3.0 |
| MAX | 19.0 |
| AV DEPTH | 17.5 |

-1 = missing value

See glossary for explanation of Summary Statistics.

TABLE 3

DEPTH OF SITE (FEET) TAYLORVILLE/CHRISTIAN COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

| DATE | SITE 1 | SITE 2 | SITE 3 | MEAN | STD DEV |
|--------|--------|--------|--------|------|---------|
| 05/ 7 | 15.0 | 10.0 | 5.0 | 10.0 | 5.0 |
| 05/ 20 | 18.0 | 11.0 | 6.0 | 11.7 | 6.0 |
| 06/ 12 | 17.0 | 14.0 | 9.0 | 13.3 | 4.0 |
| 06/ 24 | 18.0 | 14.0 | 6.0 | 12.7 | 6.1 |
| 07/ 7 | 17.5 | 10.0 | 5.0 | 11.2 | 5.0 |
| 07/ 23 | 17.5 | 10.0 | 5.0 | 10.8 | 6.3 |
| 08/ 4 | 18.5 | 12.5 | 6.0 | 12.3 | 6.3 |
| 08/ 19 | 17.0 | 10.0 | 6.0 | 11.0 | 5.6 |
| 09/ 8 | 18.0 | 10.5 | 5.0 | 11.2 | 5.6 |
| 09/ 22 | 17.0 | 10.0 | 6.0 | 11.0 | 5.6 |
| 10/ 6 | 19.0 | 10.0 | 6.0 | 11.7 | 6.7 |
| 10/ 22 | 17.0 | 10.0 | 6.0 | 11.0 | 5.6 |

*****SUMMARY STATISTICS*****

| SITES | LAKE |
|----------|------|
| MEAN | 17.5 |
| STD DEV | 1.0 |
| MIN | 15.0 |
| MAX | 19.0 |
| AV DEPTH | 17.5 |

-1 = missing value

See glossary for explanation of Summary Statistics.

FIGURE 2

SECCHI DISC TRANSPARENCY (INCHES) TAYLORVILLE/CHRISTIAN COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

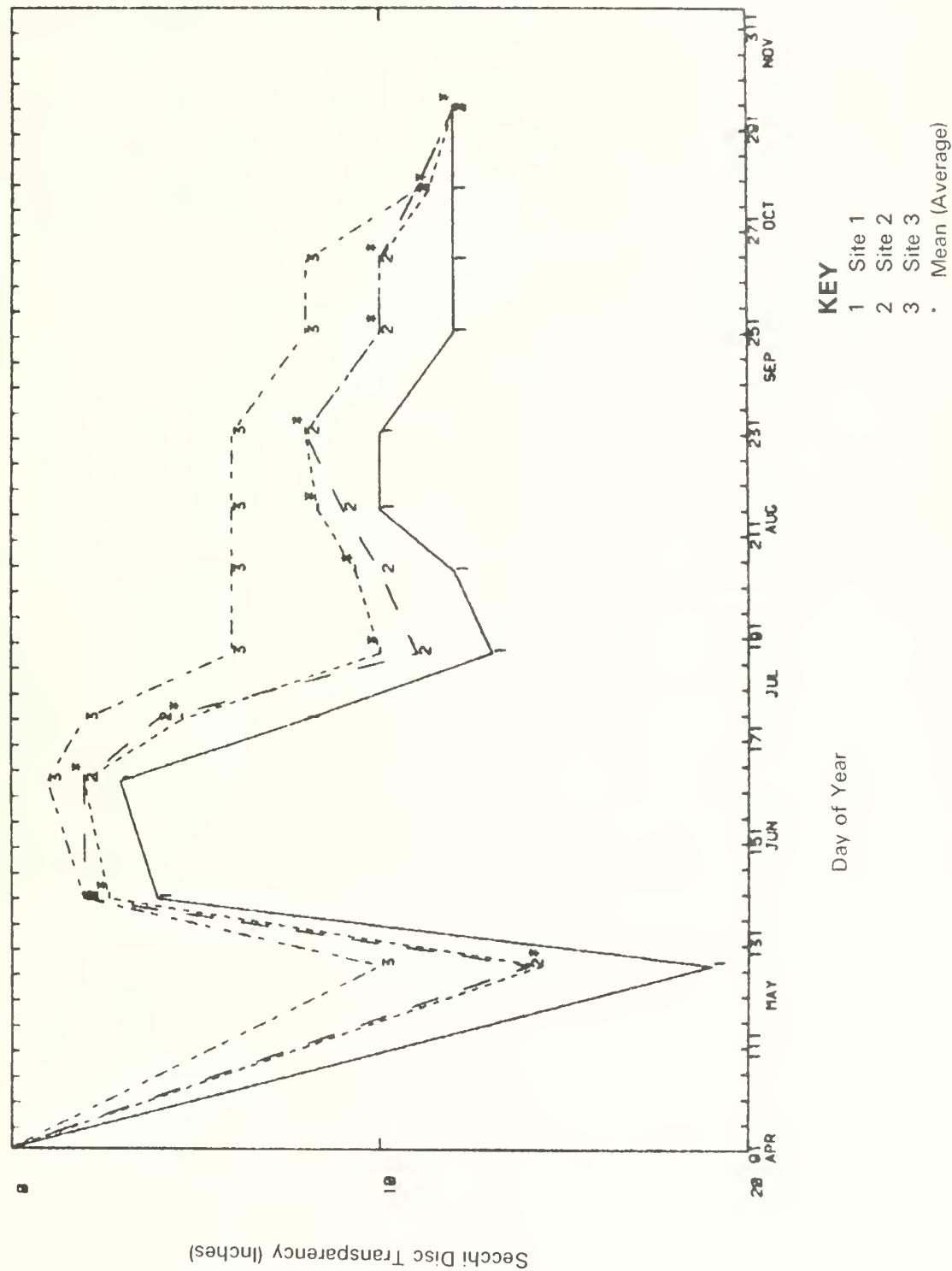


TABLE 4. FIELD OBSERVATIONS, LAKE TAYLORVILLE, CHRISTIAN COUNTY, ILLINOIS, 1981

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|--------|---|---|---|--|---|---|--|--|
| 5/7/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | brnsh-grn slight minimal minimal minimal none no odor | brnsh-grn slight minimal minimal minimal none no odor | lt. brn. slight minimal minimal minimal none no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: OBSERVATIONS MADE BY: Bruce McKinney | clear no rain small cool N.E. | overcast v.lt. rain moderate cool | WATER LEVEL OF LAKE: 5" below normal RECREATIONAL USAGE: none LAKE MANAGEMENT: none ADDITIONAL COMMENTS: none |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|---------|---|---|---|---|---|--|--|--|
| 5/20/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | v. brown large minimal minimal minimal none no odor | v. brown large minimal minimal minimal none no odor | v. brown large minimal minimal minimal none no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: OBSERVATIONS MADE BY: Taylorville Water Dept | clear no rain calm cool N. | few clouds heavy rain moderate cool N. | WATER LEVEL OF LAKE: 9" above normal RECREATIONAL USAGE: fishing & canoeing LAKE MANAGEMENT: ADDITIONAL COMMENTS: 3" rain on May 18, 15" going over spillway |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|---------|---|---|---|---|---|--|--|---|
| 6/12/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | v. brown large minimal minimal minimal none no odor | v. brown large minimal minimal minimal none no odor | v. brown large minimal minimal minimal none no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: OBSERVATIONS MADE BY: Taylorville Water Department | overcast v. lt. rain small warm W. | overcast v. lt. rain small warm W. | WATER LEVEL OF LAKE: 3" above normal RECREATIONAL USAGE: fishing, canoeing LAKE MANAGEMENT: none ADDITIONAL COMMENTS: none |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|---------|---|---|---|---|--|------------------------------------|-----------------------------------|---|
| 6/24/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | mod. brown large minimal minimal minimal none no odor | mod. brown large minimal minimal minimal none no odor | mod. brown large minimal minimal minimal none no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: OBSERVATIONS MADE BY: Taylorville Water Dept. | overcast moderate warm W. | few clouds small warm W. | WATER LEVEL OF LAKE: normal RECREATIONAL USAGE: swimming, fishing, canoeing, power boating, water skiing LAKE MANAGEMENT: none ADDITIONAL COMMENTS: none |

TABLE 4. FIELD OBSERVATIONS, LAKE TAYLORVILLE, CHRISTIAN COUNTY, ILLINOIS, 1981

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|--------|---|--|--|--|---|---|---|--|
| 7/7/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | lt. brown moderate minimal minimal minimal none | lt. brown moderate minimal minimal minimal none | mod. brown large minimal minimal minimal moderate none | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | few clouds no rain small hot S. | few clouds no rain calm warm S. | WATER LEVEL OF LAKE: 1" above normal RECREATIONAL USAGE: fishing, swimming, power boating, water skiing, camping & picnicking LAKE MANAGEMENT: none ADDITIONAL COMMENTS: none |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|---------|---|--|--|--|---|---|---|--|
| 7/23/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | grnsh-brn slight minimal minimal minimal none | grnsh-brn slight minimal minimal minimal none | grnsh-brn moderate minimal minimal minimal slight none | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | overcast v. lt. rain ripple warm N.E. | few clouds no rain small hot N.E. | WATER LEVEL OF LAKE: 1" above normal RECREATIONAL USAGE: fishing, power boating water-skiing, camping & picnicking LAKE MANAGEMENT: none ADDITIONAL COMMENTS: none |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|--------|---|--|--|--|---|--|--|--|
| 8/4/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | grnsh-brn slight minimal minimal minimal none | brnsh-grn slight minimal minimal minimal none | lt. brown moderate minimal minimal minimal slight none | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | few clouds no rain ripple hot S.E. | few clouds no rain ripple hot S.E. | WATER LEVEL OF LAKE: 4" above normal RECREATIONAL USAGE: fishing, swimming, power boating, water-skiing, row boating, sailing, camping & picnicking LAKE MANAGEMENT: none ADDITIONAL COMMENTS: none |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|---------|---|--|--|---|---|--|---|---|
| 8/19/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | pea soup minimal minimal minimal minimal none | mod. green minimal minimal minimal minimal none | brnsh-grn. slight minimal minimal minimal slight none | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | many clouds no rain ripple warm N.E. | few clouds no rain ripple warm N.E. | WATER LEVEL OF LAKE: 2" above normal RECREATIONAL USAGE: fishing, power boating, camping & picnicking LAKE MANAGEMENT: none ADDITIONAL COMMENTS: none |

TABLE 4. FIELD OBSERVATIONS, LAKE TAYLORVILLE, CHRISTIAN COUNTY, ILLINOIS 1981

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|--------|---|--|--|--|---|--|---|---|
| 9/8/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | grnsh-brn. slight minimal minimal minimal minimal none | grnsh-brn. slight minimal minimal minimal minimal none | grnsh-brn. slight minimal minimal minimal minimal none | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | few clouds no rain ripple wave warm nw | overcast lt. rain ripple wave warm nw | WATER LEVEL OF LAKE: 1" above normal RECREATIONAL USAGE: fishing, power boating, camping LAKE MANAGEMENT: ADDITIONAL COMMENTS: |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|---------|---|---|---|---|---|---|--|---|
| 9/22/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | grnsh-brn moderate minimal minimal minimal minimal none | green-brn moderate minimal minimal minimal minimal none | brnsh-brn moderate minimal minimal minimal minimal none | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | overcast no rain ripple warm N. | many clouds no rain ripple warm N. | WATER LEVEL OF LAKE: 1" above normal RECREATIONAL USAGE: fishing LAKE MANAGEMENT: none ADDITIONAL COMMENTS: none |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|---------|---|---|---|---|---|---|---|--|
| 10/6/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | grnsh-brn slight minimal minimal minimal minimal none | grnsh-brn slight minimal minimal minimal minimal none | grnsh-brn slight minimal minimal minimal minimal none | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | few clouds no rain moderate warm S.E. | many clouds lt. rain ripple warm S. | WATER LEVEL OF LAKE: normal RECREATIONAL USAGE: fishing LAKE MANAGEMENT: none ADDITIONAL COMMENTS: none |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|----------|---|---|---|---|---|---|--|---|
| 10/22/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | grnsh-brn slight minimal minimal minimal minimal none | grnsh-brn slight minimal minimal minimal minimal none | grnsh-brn slight minimal minimal minimal minimal none | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | overcast v.lt. rain small cool N. | few clouds no rain small warm S.W. | WATER LEVEL OF LAKE: none RECREATIONAL USAGE: none LAKE MANAGEMENT: none ADDITIONAL COMMENTS: none |

the water becomes clearer towards the dam. As the sediment settles out, algae appear to become more of a problem, as evidenced by the change in water color from brown at Site 3 to greenish-brown at Site 1 on several sampling dates.

Relationship to Lake Use

Secchi disc transparency may indicate the potential of the lake for exhibiting water quality and use impairment problems. It may also help a fisherman locate the most likely fish habitat.

Generally, from the surface to between two and five times the Secchi disc depth can be considered the euphotic (lighted) zone of the lake; in this region there is enough light to allow plants to survive and produce oxygen by photosynthesis. This is also the zone of greatest fish activity. Waters below the euphotic zone can be expected to have little or no dissolved oxygen during the summer if the lake is thermally stratified (has layers of water of different temperatures). During this stratification period, fish will probably be limited to the euphotic or aerobic (oxygenated) zone of the lake.

The lower limit of the euphotic zone of Lake Taylorville (estimated at twice the Secchi depth) ranged from 0.5-3.2 feet at Site 1, from 0.3-2.3 feet at Site 2, from 0.2-2.0 feet at Site 3. Since Site 1 on Lake Taylorville is deep enough to thermally stratify and had an euphotic zone that was generally less than the total depth, low dissolved oxygen values would be expected in the bottom waters of this site. The euphotic zone of Sites 2 and 3 (average total depths 9.0 feet and 4.0 feet, respectively) generally extended to the bottom during the sampling period.

In the absence of dissolved oxygen, undesirable substances such as hydrogen sulfide, ammonia, methane, phosphorus, iron, and manganese may accumulate in the bottom waters. These substances can contribute to serious taste and odor problems in drinking water if water supply is taken from near the lake bottom during summer stratification. When the substances which have accumulated in the bottom waters during stratification periods are distributed throughout the lake during mixing periods, they can trigger nuisance algal blooms, aquatic weed growth, taste and odor, and other water quality problems.

SUMMARY AND RECOMMENDATIONS

Summary

Lake Taylorville, a large shallow public water supply and recreational impoundment in central Illinois, was sampled on twelve dates between May 1 and October 31, 1981 under the Illinois EPA's Volunteer Lake Monitoring Program. Volunteers from the Taylorville Water Department recorded Secchi disc transparency, total depth, and field observations at three sites and reported results to the Illinois EPA.

The average Secchi disc transparency of Lake Taylorville (8.6 inches) ranked 83rd of the 87 lakes monitored by volunteers in 1981 (rank 1 is clearest; 87 is least transparent). This average transparency was less than the four feet minimum recommended for swimming by the Illinois Department of Public Health, and was in the range generally associated with use impairment problems for Illinois lakes.

Lake Taylorville is deep enough to thermally stratify during the summer. Since the lower limit of its euphotic zone (estimated at twice the Secchi depth) is generally less than the total depth, low bottom water dissolved oxygen values, associated water quality problems, and limitation of fish habitat may be expected during summer stratification.

Lake Taylorville is undergoing the process of eutrophication, as evidenced by transparency readings and field observations of sediment problems. Protection from further degradation is critical. If nutrient and sediment input were controlled, lake quality would probably improve; failure to control inputs will probably result in continued rapid eutrophication. Lake managers should identify sources of nutrient and sediment input and take steps to control them before the lake becomes further degraded.

Developing a management plan for a lake requires a comprehensive assessment of the lake and watershed and is beyond the scope of this project. However, some suggestions regarding lake management are presented below for consideration; their applicability to this lake would require further study. Alternative options not presented here may also apply.

Lake managers should work with the Soil and Water Conservation District and the Soil Conservation Service to develop a procedure to identify and quantify non-point pollution source areas. This procedure should allow for the targeting of resources and programs to correct the identified problems.

Installation of Resource Management Systems in source areas of the watershed may reduce nutrient and sediment transport to the lake. Stabilization of the lake shoreline by riprap or some other means may also reduce sediment input. Nutrient contributions from septic tanks, fertilization of lawns, and waterfowl should also be investigated and minimized.

In-lake management may also warrant consideration. Drawing oxygenated water from the upper strata for water supply use may help alleviate taste and odor problems. Aeration-destratification to prevent dissolved oxygen depletion may promote a shift in algal populations to species other than the problem-causing blue-greens, reduce the need for copper sulfate, help alleviate taste and odor problems and improve fishing.

Continued monitoring is recommended for Lake Taylorville. Consistent data gathered over a period of years is necessary to more fully document and evaluate water quality trends, identify problems, and evaluate lake/watershed management strategies.

REFERENCES

Illinois Department of Conservation. 1977. Illinois Inland Lakes Problems Assessment Data Form, filled out for Illinois Environmental Protection Agency, "Assessment and Classification of Illinois Lakes."

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DS:jab/sp3873C

GLOSSARY*

acre-foot - the volume of water required to cover one acre to a depth of one foot and equal to 0.3258 million gallons; a unit of storage capacity obtained by multiplying surface area (in acres) by average depth (in feet).

aeration-destratification - the addition of air to the water through mechanical means to increase the dissolved oxygen content of the bottom waters of lakes by eliminating thermal stratification and homogenizing the entire water column.

aerobic - conditions characterized by the presence of oxygen.

algae - one-celled or colonial photosynthetic plants (usually microscopic), found suspended in water or attached to damp rocks or other substrates.

algal bloom - a large number of planktonic algae, which often turns the water green and may produce objectionable scums and odors; a condition in which algae cloud the water noticeably.

ambient - existing condition or level at the time and place.

ammonia - a colorless, gaseous, alkaline compound which is a decompositional end product of nitrogen-containing organic matter; its importance in fresh water is associated with its toxicity to aquatic organisms and its use as a nutrient for aquatic plant growth.

anaerobic - conditions characterized by the absence of oxygen.

anoxic - without oxygen.

aquatic - growing or living in water; pertaining to water.

aquatic weeds - larger plants easily visible to the naked eye which are submergent, floating or emergent in the water.

artificial - man-made; constructed.

average depth - mean depth of a lake, calculated by dividing the volume (storage capacity) by the surface area.

backwater (or river backwater) - water impoundment located along the side of a stream or river which may flood periodically or have a direct connection to the stream at all times.

blue-green algae - a group of one celled or colonial plants of the phylum Cyanophyta, which live in water or damp places and reflect a blue to dark green tint; most often responsible for nuisance algal blooms with scum and odors.

borrow pit - a water impoundment formed by removal of earth for fill construction in the making of roads, dikes, bridges and levees

bottomland lake - natural water impoundment located in a river floodplain

circulation period - mixing period for a lake; period of time in which the entire lake volume is not thermally stratified and is totally mixed by wind action.

condition - the overall quality of the lake for supporting general use

detritus - finely divided organic and inorganic settleable material suspended in the water

diatoms - a group of one-celled or colonial algae living in water or damp places which are characterized by the presence of yellow-green or brown pigments and cell walls which contain silica and are composed of two halves (valves), one overlapping the other like the top and bottom of a pill box

drainage area - watershed; the land surface surrounding the lake which contributes water via surface runoff to the the lake

ecology - the study of the relationship of organisms to their environment

emergent - a rooted aquatic plant with parts normally extending above the water surface

epilimnion - upper, relatively warm, circulating zone of water in a thermally stratified lake

euphotic zone - region of a lake where light penetration is sufficient to maintain photosynthesis; its lower limit is generally two to five times the Secchi disc transparency.

eutrophic - waters which are rich in plant nutrients and capable of supporting high biological productivity; USEPA defines a eutrophic lake as one that exhibits any of the following characteristics: biomass accumulations of primary producers (algal blooms and excessive aquatic weeds); rapid organic or inorganic sedimentation and shallowing; or seasonal dissolved oxygen deficiencies in the bottom waters and subsequent shift in species composition of aquatic fauna to forms that can tolerate lower concentrations of oxygen.

eutrophication - lake aging trhough nutrient enrichment and sedimentation.

fertile - waters rich in plant nutrients.

glacial lake - body of standing water formed by glacial action.

green algae - a group of one-celled or colonial plants of the phylum Chlorophyta, which live in water or damp areas and reflect a greenish tint.

hydrogen sulfide - a gaseous compound produced under anaerobic conditions which has a rotten egg smell.

hypolimnion - lower, relatively cold, noncirculating zone in a thermally stratified lake.

impairment - that which damages or negatively impacts the present or potential use of a body of water.

impoundment - a body of standing water constructed by artificial means or formed by nature.

in-lake treatment or control techniques - methods to limit the availability of pollutants already in the lake or to accelerate their outflow; and various physical, chemical and biological approaches for managing the consequences of degradation and enhancing the usability of the lake without controlling the source of the degradation.

iron - an essential micronutrient, which is considered objectionable in water supplies because it can cause taste and odor problems and stain laundry.

lake - a body of standing water 6.0 acres or more in surface area (as defined by the Illinois Department of Conservation).

lake code - an eight-digit combination of letters and numbers used to identify a lake in the computer.

limnologist - aquatic ecologist; one who studies the physical, chemical, and biological aspects of lakes.

limnology - the study of the ecology of inland lakes.

littoral - shoreward region of a body of water.

macrophyte - large plant of macroscopic size (easily visible to the naked eye).

management - non-structural measures designed to enhance the quality and usability of a lake.

manganese - an essential micronutrient, which is considered objectionable at high concentrations because it can cause taste and odor problems.

maximum (max) - highest (largest) value observed in a data set.

maximum depth - depth of deepest point in a lake.

mean - a statistical term for average, calculated by totalling the values and dividing by the number of observations.

mean depth - the volume of a lake divided by its surface area; average depth.

mesotrophic - waters intermediate in character between oligotrophic and eutrophic; moderately well supplied with plant nutrients and capable of supporting moderate biological productivity.

minimum (min) - smallest (lowest) value observed in a data set.

mixing period - circulation period of a lake; period of time in which the lake is not thermally stratified and is totally mixed by wind action.

nitrogen - an element which is an essential plant nutrient and is one of the principal elemental constituents of proteins.

nonpoint pollution - pollution from diffuse sources (e.g., agriculture, forestry operations, mining, construction) for which a specific point of discharge cannot be readily identified.

nutrient - any chemical element, ion or compound that is required by an organism for the continuation of growth, reproduction and other life processes; nitrogen and phosphorus are usually growth limiting factors for aquatic plants.

oligotrophic - waters with low concentrations of plant nutrients and hence capable of supporting little biological productivity.

organizational impoundment - body of standing water owned, leased or maintained by an organization of six or more members (as defined by the Illinois Department of Conservation).

phosphorus - an element which is an essential plant nutrient and plays a vital role in the energy transfer during cell metabolism.

photosynthesis - the process by which green plants use the sun's energy to convert dioxide and water into chemical energy (carbohydrates, fats, and proteins).

phytoplankton - microscopic plants (algae) that drift passively in open water regions of lakes and rivers.

plankton - the community of microscopic plants and animals that drift passively in open water regions of lakes and rivers.

point source pollution - pollution emanating from a discharge point such as a pipe which can be specifically identified (e.g., sewage treatment plants, manufacturing plants).

pollution - any substance which makes another unclean or impure.

pond - small body of standing water less than 6.0 acres in surface area (as defined by the Illinois Department of Conservation).

potable - of quality for drinking.

private impoundment - body of standing water privately owned or leased with no fee charged for use (as defined by the Illinois Department of Conservation).

production - total amount of living matter produced in a lake per unit time.

productivity - rate at which organic material (and energy) is produced and transferred through organisms in an ecosystem; standing crop of organisms that can be supported.

protection - pollution abatement or control; measures to prevent pollution from entering a lake, including methods to stop the pollution at its source or to treat it before it reaches the lake.

public access - publicly owned contiguous land or easements providing any member of the public the same or equivalent opportunity to enjoy privileges and benefits of the lake as any other member of the public or as any resident around the lake.

public impoundment - body of standing water owned and maintained by a governmental agency (excluding the Illinois Department of Conservation) that have public access.

public water supply - used as a municipal water supply for domestic needs.

Resource Management Systems - best management practices for the control and abatement of nonpoint pollution; a combination of agricultural practices which reduce soil erosion and/or increase water retention.

restoration - structural measures designed to return a lake to its original condition (e.g., dredging to original depth).

reservoir - a watershed impoundment artificially constructed by damming of a stream.

resuspend - cause to be suspended in the water.

river basin - drainage area for a large river.

seasonal - over a period of time (seasonal).

Secchi disc - an eight-inch diameter weighted metal plate painted black and white in alternating quadrants which is lowered into the water on a calibrated line to measure the transparency or clarity of the water.

Secchi disc depth - the depth into the water to which a black and white circular disc can be seen when viewed from the surface; a measure of water transparency or its ability to allow vertical light penetration.

sediment - the solid materials (particulate matter) transported by, suspended in or deposited from, water; includes fragmentary material that originates from weathering of rock, chemical and biochemical precipitants and decomposed organic material such as humus.

sediment-related turbidity - muddiness; cloudiness or opaqueness of the water caused by suspended sediment.

sedimentation - deposition of organic and/or inorganic particulate matter.

sedimentation surveys - measurement of the amount of sediment deposited in a water body.

segments - a subwatershed within a large river basin.

spatial - differences over an area.

standard deviation (Std. Dev.) - a statistical term to describe the variability of the data around the mean (average); if the magnitude of the standard deviation is "small" relative to the mean, then most of the values are close to the mean in magnitude and the data has little variability (is relative uniform); if the standard deviation is large in magnitude relative to the mean, then the data is more variable.

state impoundment - a body of standing water owned or leased and maintained by the Illinois Department of Conservation.

storage capacity - volume of water an impoundment can hold; often expressed in acre-feet, million gallons, and cubic meters.

submergent - an aquatic plant that lives and grows entirely below the surface of the water.

succession - in ecology, the progressive change of plant and animal life in an area.

suspended sediment - the sediment that at any given time is maintained in suspension by current or as a colloid.

suspended solids - particulate material that at any given time is maintained in suspension by current or as a colloid; total suspended solids are all suspended particulate material, volatile and non-volatile, organic and inorganic; volatile suspended solids is that suspended particulate material, generally organic in nature, which undergoes combustion at a temperature of 600°C.

suspension - a heterogenous mixture in which the particles of one substance are kept dispersed by agitation.

thermal stratification - the layering of the water in a lake due to different densities as a function of temperature; the layers are the epilimnion (upper), metalimnion or thermocline (middle), and the hypolimnion (lower).

thermocline - metalimnion; the middle layer of water in a thermally stratified lake in which temperature decreases rapidly with increasing depth.

transparency - ability to allow light penetration and be seen through; clarity.

trophic state - the degree of eutrophication of a lake; the rate of primary biological production it is capable of supporting.

turbid - cloudy, opaque, murky, dirty-looking; containing suspensoids (organic or inorganic) which interfere with light penetration.

turbidity - amount of scattering of light caused by material suspended in the water.

use impairment - that which damages or negatively impacts the present or potential use of a body of water.

water quality - the suitability of the water for supporting various uses.

water retention time - water residence time; period of time a mass of water remains in an impoundment.

watershed - drainage area; the land surface surrounding the lake which contributes water, via surface runoff, to the lake; the total or contributing watershed area is the total draining to the lake, including the lake surface area; the immediate or net watershed is the portion of the total watershed (free of lakes or sloughs) from which direct, unimpeded surficial runoff drains to the lake.

zooplankton - animal portion of the community of suspended or floating organisms which drift passively with the water currents.

ABBREVIATIONS AND SYMBOLS

av - average
brn - brown
brnsh-grn - brownish-green
grn-brn - green-brown
grnsh-brn - greenish-brown
lt - light
max - maximum value
min - minimum value
mod - moderately
std. dev. - standard deviation
v - very

Explanatory example of lake code:

Anderson Lake

RD-B05-A

D = Illinois River Basin

denotes lake as opposed to stream

basin segment and sub-segment

letter denoting specific lake within a basin segment

*Definitions of items in sense used in text

DS:sp,6207a,1-8

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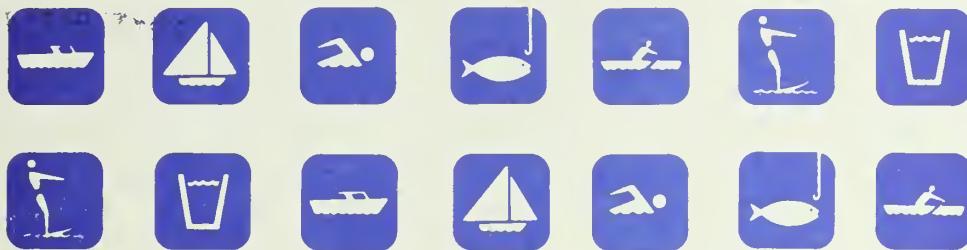
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1981 VOLUNTEER LAKE
MONITORING PROGRAM REPORT



SWAN LAKE | CAUHOUN CO.

NATURAL HISTORY
AUG 27 1981

1981 VOLUNTEER LAKE MONITORING PROGRAM REPORT
FOR
SWAN LAKE, CALHOUN COUNTY, ILLINOIS

A Cooperative Citizen -
Illinois Environmental Protection Agency
Project

May, 1982
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706

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Illinois EPA's Ambient Monitoring Unit, Planning Section, Division of Water Pollution Control, under the direction of Kenneth R. Rogers, was responsible for the design and implementation of the program, as well as preparation of this report. Substantial assistance was provided by the Agency's Public Participation Section supervised by Gloria Craven.

Program coordination was provided by Donna Sefton for the Illinois EPA's Ambient Monitoring Unit and Carol Beim for the Public Participation Section.

Volunteers were trained by Public Participation Coordinators Carol Beim, Bob Hagele, William Hammel, Patrick McCarthy, Vanessa Musgrave, and Dawn Wrobel. Lake maps were prepared by J. W. Hammel and Bob Hagele. Lake assessment summaries were prepared by Patrick McCarthy.

Assessment and monitoring information was provided by approximately 140 volunteers throughout the state.

Data handling was performed by John Little, Jill Hardin, Marilyn Budd, Lori Whalen, Cora Stockton, and Karen Janssen. Data analyses were performed and tabular and graphical outputs obtained by John Little using programs developed for the Tektronix desk top computer terminal by Dr. David J. Schaeffer and Vladimir Chernomordikov.

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INTRODUCTION

A cooperative volunteer lake monitoring effort was initiated by the Illinois EPA in 1981 as part of an overall self-help, service program being developed for lakes. In addition to expanding the Agency's lakes data base with information on present water quality and trends, the program was designed to involve citizens in learning about a lake so they could make more informed decisions regarding its use, protection, and enhancement.

Citizens selected a lake they were concerned about and were trained to measure water clarity or transparency by recording the depth to which a Secchi disc (an eight-inch diameter metal plate painted black and white in alternating quadrants) was visible. They also measured total depth and recorded field observations from a boat at three sites on their chosen lake. Readings were to be taken twice a month from May through October and reported to the Agency on special data forms. The Secchi disc, data forms, and postage paid envelopes were provided by the Agency. Volunteers were required to have a boat with an anchor to perform the monitoring.

Approximately 140 volunteers participated in monitoring 87 lakes in 1981. The sampling data were computerized to facilitate analyses and preparation of tables and graphs for reports. A statewide report entitled "Volunteer Lake Monitoring, 1981", summarized all the data for the volunteer lakes. Individual reports were also prepared for each of the 87 lakes monitored by volunteers in 1981.

BACKGROUND

Swan Lake is a 1,500 acre Illinois River backwater which is part of the Mark Twain National Wildlife Refuge. It is located in Calhoun County, 2 miles northeast of Brussels, Illinois and managed by the U.S. Fish and Wildlife Service. The lower northeast end of the lake opens into the Illinois River; the lake surface area and level varies with the stage of the river. The maximum depth of Swan Lake is about 5 feet, the average depth is 3 feet, and the storage capacity is 3,750 acre-feet (Table 1).

Swan Lake serves as a recreational area, with waterfowl observation the major use. It is also used for fishing, rowboating, and canoeing. Access is restricted during the fall months due to the large concentrations of waterfowl.

The watershed drainage area of Swan Lake is estimated to be 60 percent row crops. The lake shoreline is primarily covered by woodland and row crops.

Suspended sediment and deposition of sediment are considered substantial problems for Swan Lake. Aquatic weeds are considered a moderate problem. Cropland runoff and sediment in the lake are cited as potential pollution sources.

TABLE 1. LAKE ASSESSMENT SUMMARY FORM, SWAN LAKE, CALHOUN COUNTY, ILLINOIS (SD-B02-M).

I. GENERAL INFORMATION

River Basin: Illinois
Segment: B02

Ownership: Managed by U.S. Fish & Wildlife Service

Surface Area (Acres): 1500 (2345.0*)

Watershed Area (Acres):

Maximum Depth (Feet): 5

Average Depth (Feet): 2.5 (3.0*)

Storage Capacity (Acre/Feet): 3750 (7035*)

Inflowing Stream(s): lower end open s. to IL. River

Outflowing Stream(s): lake rises and lowers accordingly;

Water Retention Time: 5-6 inflowing tributaries

Lake Type: River backwater

Year Constructed:

II. USAGE

Public Access: yes

Lake Usage:

Potable Water Supply: none

Industrial Water Supply: none

Agricultural Water Supply: none

Cooling Water: none

Recreation:

Fishing: moderate

Swimming: none

Power Boating: none

Row Boating or Canoeing: light

Sailboating: none

Camping: none

Picnicking: none

Waterfowl Hunting: none

Waterfowl Observation: very heavy

Other:

Recreational Facilities:

Shoreline Usage (Percent):

Urban (Including Streets):

Residential (Including Lawns):

Golf Courses:

Pasture or Grassland:

Woodland: 30%

Row Crops: 30%

Wetland: 40%

Other:

Watershed Usage (Percent):

Urban:

Residential:

Golf Courses:

Pasture or Grassland:

Woodland: 10%

Row Crops: 60%

Wetland: 30%

Other:

III. WATER QUALITY AND PROBLEMS

General Water Quality: fair

Fishing: fair

Conditions and Extent:

Suspended Sediment: large - turbidity high all year

Deposition of Sediment: large

Algal Blooms: slight

Aquatic Weeds: moderate

Taste and/or Odor: slight

Water Level Fluctuation: slight

Fishkills: minimal

Other:

IV. CAUSES OF WATER QUALITY PROBLEMS

Potential Pollution Sources:

Sewage Treatment Plant Effluent:

Industrial Discharge:

Urban Storm Drainage:

Septic Tanks:

Pasture or Grassland Runoff:

Cropland Runoff: yes

Feedlot Runoff:

Construction Site Runoff:

Fertilizer or Pesticides from Lawns/Golf Courses:

Orchards:

Forestry Operations Runoff:

Mining:

Waterfowl:

Sediment in Lake: yes

Other: Illinois River; carp

V. LAKE MANAGEMENT

Comments: Change of agricultural practices from orchards

to row cropping in adjacent upland areas has greatly

accelerated sedimentation; extreme shallow water condition

and "mucky" bottom.

Information Supplied By Robert Freeman (1981); *Illinois Department of Conservation (1977)

Note: Swan Lake is one of a number of interconnecting backwaters. Surface area estimates vary greatly depending on how the boundaries are defined and the river stage.

Assessment information on Swan Lake was provided by Robert Freeman and the Illinois Department of Conservation. Monitoring was performed by Robert and Ken Freeman. Secchi disc depth, total depth, and field observations were recorded at three sites (located in Fig. 1) on six dates in 1981: May 17, June 6, August 14 and 20, and September 12 and 27.

RESULTS AND DISCUSSION

In this section, monitoring results will be presented for the lake and compared to those for other lakes in the volunteer program. Then spatial (within lake) and seasonal differences in transparency will be examined and related to field observations. Results will also be discussed in terms of lake uses. For an explanation of unfamiliar terms or concepts presented here, refer to the report "Volunteer Lake Monitoring, 1981", Section IV "Understanding Illinois' Lakes."

The Secchi monitoring data for Lake Thunderbird are summarized in Table 2 and plotted in Figure 2. Total depth data are provided in Table 3, while field observations are summarized in Table 4.

Transparency of Swan Lake

The average Secchi disc transparency of Swan Lake was 8.7 inches, which ranked 82nd when the average transparencies of the volunteer lakes were ranked from clearest (number 1 at 137.8 inches) to least transparent (number 87 at 7.3 inches). This average transparency was less than the four feet minimum recommended for swimming by the Illinois Department of Public Health (1976).

Spatial and Seasonal Differences in Transparency

The Secchi disc transparency of Swan Lake ranged from a maximum of 18 inches at Site 1 on May 17 to a minimum of 5 inches at Site 1 on September 27.

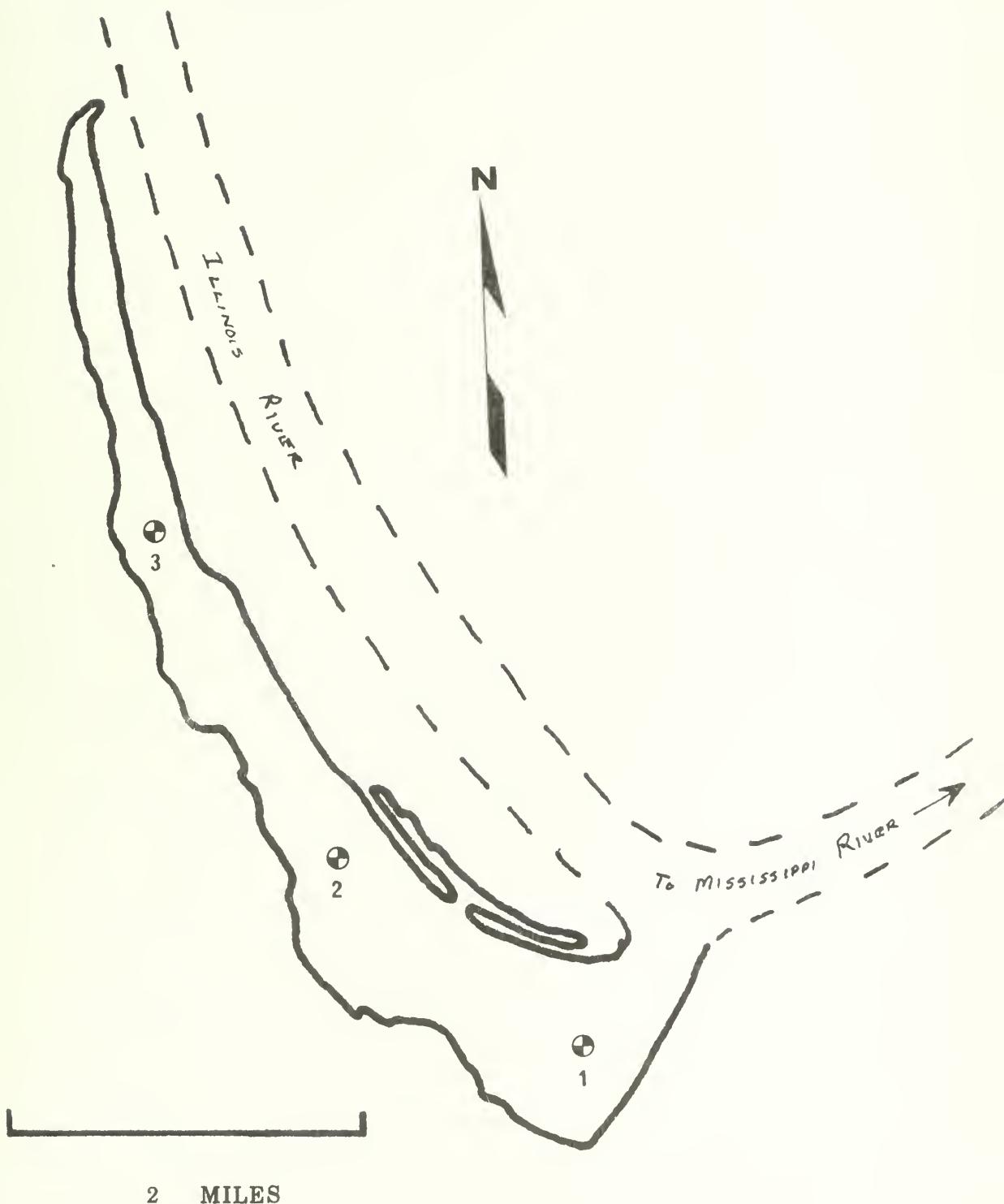
Swan Lake was extremely turbid throughout the May-September sampling period. Field observations indicate that the lack of transparency was due primarily to suspended sediment.

Clarity within Swan Lake was generally uniform; average transparencies were 9.3 inches, 8.3 inches and 8.3 inches at Sites 1, 2 and 3, respectively. The low Secchi readings are related, in part, to the shallow nature of the lake (average depth 3.0 feet) and resultant stirring up of sediment by wind and wave activity.

Relationship to Lake Use

Secchi disc transparency may indicate the potential of the lake for exhibiting water quality and use impairment problems. It may also help a fisherman locate the most likely fish habitat.

FIGURE 1
SWAN LAKE
CALHOUN COUNTY



2 MILES

TABLE 2

| SECTION: DISC TRANSPARENCY SITES: SWAN CALHOUN COUNTY, ILLINOIS (VOLUNTEER DATA 1981) | | | | | |
|---|--------|--------|--------|------|---------|
| DATE | SITE 1 | SITE 2 | SITE 3 | MEAN | STD DEV |
| 85/ 17 | 1.8 | 1.4 | 1.3 | 1.5 | 2.6 |
| 86/ 6 | 1.0 | 1.0 | 1.0 | 1.0 | 2.6 |
| 88/ 14 | 6.0 | 8.0 | 8.0 | 8.0 | 0.0 |
| 88/ 22 | 6.0 | 6.0 | 6.0 | 6.0 | 0.0 |
| 89/ 12 | 6.0 | 6.0 | 6.0 | 6.0 | 0.0 |
| 89/ 27 | 5.0 | 6.0 | 6.0 | 5.7 | 2.6 |

*****SUMMARY STATISTICS*****

| LAKE | | | | | |
|------|---------|-----|-----|----------|-----|
| MEAN | STD DEV | MIN | MAX | AV DEPTH | |
| 9.3 | 4.7 | 3 | 13 | 13 | 8.7 |
| 5.0 | 5.0 | 6 | 13 | 6 | 3.5 |
| 18.0 | 2.0 | 2 | 2 | 6 | 5.0 |

-1 = missing value

See glossary for explanation of Summary Statistics.

TABLE 3

| DEPTH OF SITE (FEET) SWAN CALHOUN COUNTY, ILLINOIS (VOLUNTEER DATA 1981) | | | | | |
|--|--------|--------|--------|------|---------|
| DATE | SITE 1 | SITE 2 | SITE 3 | MEAN | STD DEV |
| 85/ 17 | 1.0 | 3.0 | 3.0 | 3.0 | 0.6 |
| 86/ 6 | 2.0 | 2.5 | 2.5 | 2.7 | 0.3 |
| 88/ 14 | 2.0 | 3.0 | 3.0 | 2.7 | 0.6 |
| 88/ 20 | 2.0 | 2.5 | 2.5 | 2.7 | 0.3 |
| 89/ 12 | 1.0 | 1.2 | 1.0 | 1.0 | 0.2 |
| 89/ 27 | 1.0 | 1.5 | 1.0 | 1.2 | 0.3 |

*****SUMMARY STATISTICS*****

| LAKE | | | | | |
|------|---------|-----|-----|----------|-----|
| MEAN | STD DEV | MIN | MAX | AV DEPTH | |
| 2.0 | 0.8 | 1.0 | 4.0 | 2.0 | 2.3 |
| 1.0 | 1.2 | 1.0 | 1.0 | 1.0 | 0.0 |
| 3.0 | 2.0 | 4.0 | 3.0 | 2.0 | 4.0 |
| 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.2 |

-1 = missing value

See glossary for explanation of Summary Statistics.

FIGURE 2

SECCI DISC TRANSPARENCY (INCHES) SEAN CALDWELL COUNTY, ILLINOIS VOLUNTEER DATA 1981

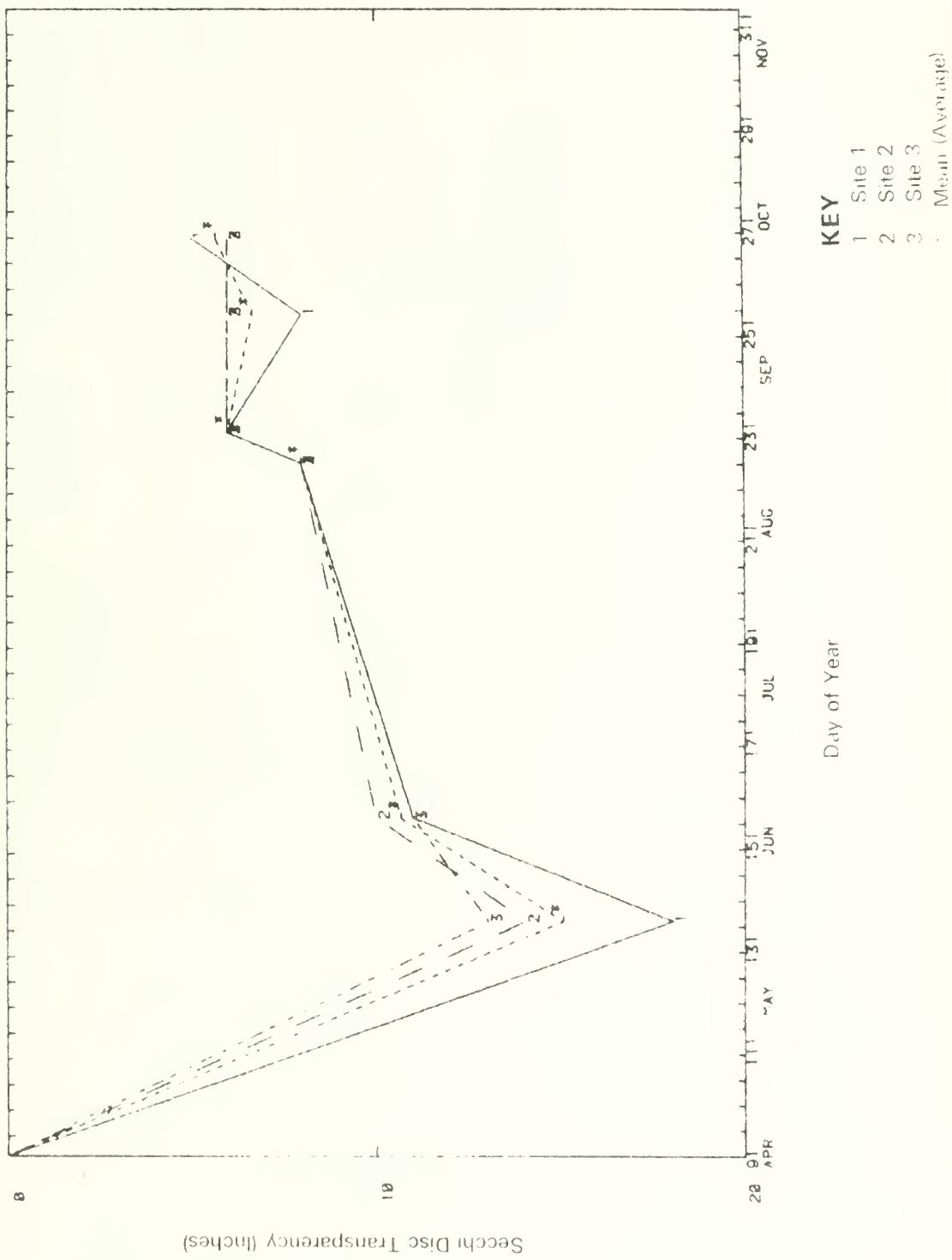


TABLE 4. FIELD OBSERVATIONS, SWAN LAKE, CALHOUN COUNTY, ILLINOIS.

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEDING 24 HOURS | OTHER COMMENTS |
|---------|---|--|---|---|---|--------------------------------------|------------------------------------|--|
| 5/17/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | lt. brown large minimal minimal minimal slight * | lt. brown large minimal minimal minimal minimal * | lt. brown large minimal minimal minimal minimal * | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | overcast lt. rain calm warm | clear no rain ripple warm | WATER LEVEL OF LAKE: RECREATIONAL USAGE: fishing none LAKE MANAGEMENT: ADDITIONAL COMMENTS: |

*cans, bottles, plastics

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEDING 24 HOURS | OTHER COMMENTS |
|--------|---|--|--|---|---|--|---|--|
| 6/6/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | lt. brown large minimal minimal minimal slight * | lt. brown large minimal minimal minimal moderate * | lt. brown large minimal minimal minimal minimal * | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | hazy no rain ripple warm S | many clouds no rain ripple warm S | WATER LEVEL OF LAKE: RECREATIONAL USAGE: normal fishing none LAKE MANAGEMENT: ADDITIONAL COMMENTS: |

*cans, bottles, plastics

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEDING 24 HOURS | OTHER COMMENTS |
|---------|---|---|---|---|---|---------------------------------------|---------------------------------------|--|
| 8/14/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | lt. brown large minimal minimal minimal moderate none | lt. brown large minimal minimal minimal slight none | lt. brown large minimal minimal minimal slight none | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | clear no rain small hot W | clear no rain small hot W | WATER LEVEL OF LAKE: RECREATIONAL USAGE: normal fishing none LAKE MANAGEMENT: ADDITIONAL COMMENTS: |

-7-

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEDING 24 HOURS | OTHER COMMENTS |
|---------|---|---|---|---|---|---|---|--|
| 8/20/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | lt. brown large minimal minimal minimal slight none | lt. brown large minimal minimal minimal moderate none | lt. brown large minimal minimal minimal moderate none | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | clear no rain small warm NE | clear no rain small warm NE | WATER LEVEL OF LAKE: RECREATIONAL USAGE: fishing & row boating none LAKE MANAGEMENT: none ADDITIONAL COMMENTS: |

TABLE 4. FIELD OBSERVATIONS, SWAN LAKE, CALHOUN COUNTY, ILLINOIS.

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|---------|---|---|--|--|---|---|---|---|
| 9/12/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | lt. brown large minimal minimal slight none no odor | lt. brown large minimal minimal moderate waterfowl no odor | lt. brown large minimal minimal moderate waterfowl no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | few clouds no rain ripple hot E | few clouds no rain ripple hot E | WATER LEVEL OF LAKE: RECREATIONAL USAGE: LAKE MANAGEMENT: ADDITIONAL COMMENTS: |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|---------|---|--|--|---|---|---|--|---|
| 9/27/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | lt. brown large minimal minimal slight waterfowl (Am. Egrets) no odor | lt. brown large minimal minimal slight waterfowl (Blue Heron) no odor | lt. brown large minimal minimal moderate none no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | clear no rain ripple cool E | overcast heavy rain moderate warm NE | WATER LEVEL OF LAKE: RECREATIONAL USAGE: LAKE MANAGEMENT: ADDITIONAL COMMENTS: |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|------|---|--------|--------|--------|---|---------|---------------------|---|
| 10- | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | | | | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | | | WATER LEVEL OF LAKE: RECREATIONAL USAGE: LAKE MANAGEMENT: ADDITIONAL COMMENTS: |

Generally, from the surface to between two and five times the Secchi disc depth can be considered the euphotic (lighted) zone of the lake; in this region there is enough light to allow plants to survive and produce oxygen by photosynthesis. This is also the zone of greatest fish activity. Waters below the euphotic zone can be expected to have little or no dissolved oxygen during the summer if the lake is thermally stratified (has layers of water of different temperatures). During this stratification period, fish will probably be limited to the euphotic or aerobic (oxygenated) zone of the lake.

The lower limit of the euphotic zone of Swan Lake (estimated at twice the Secchi depth) ranged from 0.8-3.0 feet at Site 1, 1.0-2.3 feet at Site 2, and 1.0-2.2 feet at Site 3. Since Swan Lake is so shallow (average depth 3.0 feet), the bottom water probably remains oxygenated by mixing due to wind, despite the Secchi disc transparency.

SUMMARY AND RECOMMENDATIONS

Summary

Swan Lake, a large, very shallow Illinois River backwater, was sampled on six dates between May 1 and October 31, 1981 under the Illinois EPA's Volunteer Lake Monitoring Program. Volunteers Ken and Robert Freeman recorded Secchi disc transparency, total depth, and field observations at three sites and reported results to the Illinois EPA.

The average Secchi disc transparency of Swan Lake (8.7 inches) ranked 82nd of the 87 lakes monitored by volunteers in 1981 (rank 1 is clearest; 87 is least transparent). This average transparency was less than the four feet minimum recommended for swimming by the Department of Public Health and was in the range generally associated with use impairment problems for Illinois lakes. The lake was extremely turbid throughout the 1981 sampling season.

Continued monitoring is recommended for Swan Lake. Consistent data gathered over a period of years is necessary to more fully document and evaluate water quality trends, identify problems, and evaluate lake/watershed management strategies.

REFERENCES

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Illinois State Water Survey. 1924-1981. Lake Sedimentation Surveys. Hydrology Section, Illinois State Water Survey, Urbana, Illinois.

DS:jab/sp3891C

GLOSSARY*

acre-foot - the volume of water required to cover one acre to a depth of one foot and equal to 0.3258 million gallons; a unit of storage capacity obtained by multiplying surface area (in acres) by average depth (in feet).

aeration-destratification - the addition of air to the water through mechanical means to increase the dissolved oxygen content of the bottom waters of lakes by eliminating thermal stratification and homogenizing the entire water column.

aerobic - conditions characterized by the presence of oxygen.

algae - one-celled or colonial photosynthetic plants (usually microscopic), found suspended in water or attached to damp rocks or other substrates.

algal bloom - a large number of planktonic algae, which often turns the water green and may produce objectionable scums and odors; a condition in which algae cloud the water noticeably.

ambient - existing condition or level at the time and place.

ammonia - a colorless, gaseous, alkaline compound which is a decompositional end product of nitrogen-containing organic matter; its importance in fresh water is associated with its toxicity to aquatic organisms and its use as a nutrient for aquatic plant growth.

anaerobic - conditions characterized by the absence of oxygen.

anoxic - without oxygen.

aquatic - growing or living in water; pertaining to water.

aquatic weeds - larger plants easily visible to the naked eye which are submergent, floating or emergent in the water.

artificial - man-made; constructed.

average depth - mean depth of a lake, calculated by dividing the volume (storage capacity) by the surface area.

backwater (or river backwater) - water impoundment located along the side of a stream or river which may flood periodically or have a direct connection to the stream at all times.

blue-green algae - a group of one celled or colonial plants of the phylum Cyanophyta, which live in water or damp places and reflect a blue to dark green tint; most often responsible for nuisance algal blooms with scum and odors.

borrow pit - a water impoundment formed by removal of earth for fill construction in the making of roads, dikes, bridges and levees

bottomland lake - natural water impoundment located in a river floodplain

circulation period - mixing period for a lake; period of time in which the entire lake volume is not thermally stratified and is totally mixed by wind action.

condition - the overall quality of the lake for supporting general use

detritus - finely divided organic and inorganic settleable material suspended in the water

diatoms - a group of one-celled or colonial algae living in water or damp places which are characterized by the presence of yellow-green or brown pigments and cell walls which contain silica and are composed of two halves (valves), one overlapping the other like the top and bottom of a pill box

drainage area - watershed; the land surface surrounding the lake which contributes water via surface runoff to the lake

ecology - the study of the relationship of organisms to their environment

emergent - a rooted aquatic plant with parts normally extending above the water surface

epilimnion - upper, relatively warm, circulating zone of water in a thermally stratified lake

euphotic zone - region of a lake where light penetration is sufficient to maintain photosynthesis; its lower limit is generally two to five times the Secchi disc transparency.

eutrophic - waters which are rich in plant nutrients and capable of supporting high biological productivity; USEPA defines a eutrophic lake as one that exhibits any of the following characteristics: biomass accumulations of primary producers (algal blooms and excessive aquatic weeds); rapid organic or inorganic sedimentation and shallowing; or seasonal dissolved oxygen deficiencies in the bottom waters and subsequent shift in species composition of aquatic fauna to forms that can tolerate lower concentrations of oxygen.

eutrophication - lake aging through nutrient enrichment and sedimentation.

fertile - waters rich in plant nutrients.

glacial lake - body of standing water formed by glacial action.

green algae - a group of one-celled or colonial plants of the phylum Chlorophyta, which live in water or damp areas and reflect a greenish tint.

hydrogen sulfide - a gaseous compound produced under anaerobic conditions which has a rotten egg smell.

hypolimnion - lower, relatively cold, noncirculating zone in a thermally stratified lake.

impairment - that which damages or negatively impacts the present or potential use of a body of water.

impoundment - a body of standing water constructed by artificial means or formed by nature.

in-lake treatment or control techniques - methods to limit the availability of pollutants already in the lake or to accelerate their outflow; and various physical, chemical and biological approaches for managing the consequences of degradation and enhancing the usability of the lake without controlling the source of the degradation.

iron - an essential micronutrient, which is considered objectionable in water supplies because it can cause taste and odor problems and stain laundry.

lake - a body of standing water 6.0 acres or more in surface area (as defined by the Illinois Department of Conservation).

lake code - an eight-digit combination of letters and numbers used to identify a lake in the computer.

limnologist - aquatic ecologist; one who studies the physical, chemical, and biological aspects of lakes.

limnology - the study of the ecology of inland lakes.

littoral - shoreward region of a body of water.

macrophyte - large plant of macroscopic size (easily visible to the naked eye).

management - non-structural measures designed to enhance the quality and usability of a lake.

manganese - an essential micronutrient, which is considered objectionable at high concentrations because it can cause taste and odor problems.

maximum (max) - highest (largest) value observed in a data set.

maximum depth - depth of deepest point in a lake.

mean - a statistical term for average, calculated by totalling the values and dividing by the number of observations.

mean depth - the volume of a lake divided by its surface area; average depth.

mesotrophic - waters intermediate in character between oligotrophic and eutrophic; moderately well supplied with plant nutrients and capable of supporting moderate biological productivity.

minimum (min) - smallest (lowest) value observed in a data set.

mixing period - circulation period of a lake; period of time in which the lake is not thermally stratified and is totally mixed by wind action.

nitrogen - an element which is an essential plant nutrient and is one of the principal elemental constituents of proteins.

nonpoint pollution - pollution from diffuse sources (e.g., agriculture, forestry operations, mining, construction) for which a specific point of discharge cannot be readily identified.

nutrient - any chemical element, ion or compound that is required by an organism for the continuation of growth, reproduction and other life processes; nitrogen and phosphorus are usually growth limiting factors for aquatic plants.

oligotrophic - waters with low concentrations of plant nutrients and hence capable of supporting little biological productivity.

organizational impoundment - body of standing water owned, leased or maintained by an organization of six or more members (as defined by the Illinois Department of Conservation).

phosphorus - an element which is an essential plant nutrient and plays a vital role in the energy transfer during cell metabolism.

photosynthesis - the process by which green plants use the sun's energy to convert dioxide and water into chemical energy (carbohydrates, fats, and proteins).

phytoplankton - microscopic plants (algae) that drift passively in open water regions of lakes and rivers.

plankton - the community of microscopic plants and animals that drift passively in open water regions of lakes and rivers.

point source pollution - pollution emanating from a discharge point such as a pipe which can be specifically identified (e.g., sewage treatment plants, manufacturing plants).

pollution - any substance which makes another unclean or impure.

pond - small body of standing water less than 6.0 acres in surface area (as defined by the Illinois Department of Conservation).

potable - of quality for drinking.

private impoundment - body of standing water privately owned or leased with no fee charged for use (as defined by the Illinois Department of Conservation).

production - total amount of living matter produced in a lake per unit time.

productivity - rate at which organic material (and energy) is produced and transferred through organisms in an ecosystem; standing crop of organisms that can be supported.

protection - pollution abatement or control; measures to prevent pollution from entering a lake, including methods to stop the pollution at its source or to treat it before it reaches the lake.

public access - publicly owned contiguous land or easements providing any member of the public the same or equivalent opportunity to enjoy privileges and benefits of the lake as any other member of the public or as any resident around the lake.

public impoundment - body of standing water owned and maintained by a governmental agency (excluding the Illinois Department of Conservation) that have public access.

public water supply - used as a municipal water supply for domestic needs.

Resource Management Systems - best management practices for the control and abatement of nonpoint pollution; a combination of agricultural practices which reduce soil erosion and/or increase water retention.

restoration - structural measures designed to return a lake to its original condition (e.g., dredging to original depth).

reservoir - a watershed impoundment artificially constructed by damming of a stream.

resuspend - cause to be suspended in the water.

river basin - drainage area for a large river.

seasonal - over a period of time (seasonal).

Secchi disc - an eight-inch diameter weighted metal plate painted black and white in alternating quadrants which is lowered into the water on a calibrated line to measure the transparency or clarity of the water.

Secchi disc depth - the depth into the water to which a black and white circular disc can be seen when viewed from the surface; a measure of water transparency or its ability to allow vertical light penetration.

sediment - the solid materials (particulate matter) transported by, suspended in or deposited from, water; includes fragmentary material that originates from weathering of rock, chemical and biochemical precipitants and decomposed organic material such as humus.

sediment-related turbidity - muddiness; cloudiness or opaqueness of the water caused by suspended sediment.

sedimentation - deposition of organic and/or inorganic particulate matter.

sedimentation surveys - measurement of the amount of sediment deposited in a water body.

segments - a subwatershed within a large river basin.

spatial - differences over an area.

standard deviation (Std. Dev.) - a statistical term to describe the variability of the data around the mean (average); if the magnitude of the standard deviation is "small" relative to the mean, then most of the values are close to the mean in magnitude and the data has little variability (is relative uniform); if the standard deviation is large in magnitude relative to the mean, then the data is more variable.

state impoundment - a body of standing water owned or leased and maintained by the Illinois Department of Conservation.

storage capacity - volume of water an impoundment can hold; often expressed in acre-feet, million gallons, and cubic meters.

submergent - an aquatic plant that lives and grows entirely below the surface of the water.

succession - in ecology, the progressive change of plant and animal life in an area.

suspended sediment - the sediment that at any given time is maintained in suspension by current or as a colloid.

suspended solids - particulate material that at any given time is maintained in suspension by current or as a colloid; total suspended solids are all suspended particulate material, volatile and non-volatile, organic and inorganic; volatile suspended solids is that suspended particulate material, generally organic in nature, which undergoes combustion at a temperature of 600°C.

suspension - a heterogenous mixture in which the particles of one substance are kept dispersed by agitation.

thermal stratification - the layering of the water in a lake due to different densities as a function of temperature; the layers are the epilimnion (upper), metalimnion or thermocline (middle), and the hypolimnion (lower).

thermocline - metalimnion; the middle layer of water in a thermally stratified lake in which temperature decreases rapidly with increasing depth.

transparency - ability to allow light penetration and be seen through; clarity.

trophic state - the degree of eutrophication of a lake; the rate of primary biological production it is capable of supporting.

turbid - cloudy, opaque, murky, dirty-looking; containing suspensoids (organic or inorganic) which interfere with light penetration.

turbidity - amount of scattering of light caused by material suspended in the water.

use impairment - that which damages or negatively impacts the present or potential use of a body of water.

water quality - the suitability of the water for supporting various uses.

water retention time - water residence time; period of time a mass of water remains in an impoundment.

watershed - drainage area; the land surface surrounding the lake which contributes water, via surface runoff, to the lake; the total or contributing watershed area is the total draining to the lake, including the lake surface area; the immediate or net watershed is the portion of the total watershed (free of lakes or sloughs) from which direct, unimpeded surficial runoff drains to the lake.

zooplankton - animal portion of the community of suspended or floating organisms which drift passively with the water currents.

ABBREVIATIONS AND SYMBOLS

av - average
brn - brown
brnsh-grn - brownish-green
grn-brn - green-brown
grnsh-brn - greenish-brown
lt - light
max - maximum value
min - minimum value
mod - moderately
std. dev. - standard deviation
v - very

Explanatory example of lake code:

Anderson Lake

 denotes lake as opposed to stream
basin segment and sub-segment
RD-B05-A
letter denoting specific lake within a basin segment
basin code
D = Illinois River Basin

*Definitions of items in sense used in text

DS:sp,6207a,1-8

UNIVERSITY OF ILLINOIS-URBANA
551.482V889X C002
VOLUNTEER LAKE MONITORING PROGRAM SPRIN
1981:74



3 0112 017526051

551.482

Nat. Hist. Surv.

V 889X

1981: 73

Copy. 2

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF WATER POLLUTION CONTROL
2200 CHURCHILL ROAD
SPRINGFIELD, ILLINOIS 62706



1981 VOLUNTEER LAKE

MONITORING PROGRAM REPORT

SUTTON PLACE LAKE / LAKE Co.



NATURAL HISTORY SURVEY
AUG 23 1981
LIRDADY

1981 VOLUNTEER LAKE MONITORING PROGRAM REPORT
FOR
SUTTON PLACE LAKE, LAKE COUNTY, ILLINOIS

A Cooperative Citizen -
Illinois Environmental Protection Agency
Project

May, 1982
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706

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This is one of 87 reports prepared for lakes in the 1981 Volunteer Lake Monitoring Program. It represents the coordinated effort of many individuals.

Illinois EPA's Ambient Monitoring Unit, Planning Section, Division of Water Pollution Control, under the direction of Kenneth R. Rogers, was responsible for the design and implementation of the program, as well as preparation of this report. Substantial assistance was provided by the Agency's Public Participation Section supervised by Gloria Craven.

Program coordination was provided by Donna Sefton for the Illinois EPA's Ambient Monitoring Unit and Carol Beim for the Public Participation Section.

Volunteers were trained by Public Participation Coordinators Carol Beim, Bob Hagele, William Hammel, Patrick McCarthy, Vanessa Musgrave, and Dawn Wrobel. Lake maps were prepared by J. W. Hammel and Bob Hagele. Lake assessment summaries were prepared by Patrick McCarthy.

Assessment and monitoring information was provided by approximately 140 volunteers throughout the state.

Data handling was performed by John Little, Jill Hardin, Marilyn Budd, Lori Whalen, Cora Stockton, and Karen Janssen. Data analyses were performed and tabular and graphical outputs obtained by John Little using programs developed for the Tektronix desk top computer terminal by Dr. David J. Schaeffer and Vladimir Chernomordikov.

Donna Sefton, Howard Essig, John Little, John Lesnak, Carol Beim, and Bob Hagele wrote portions of the lake reports. Reports were edited by Planning Section and Public Participation staff, particularly Marilyn Budd and Mary Anderson. The contributions of Robert Clarke and Thomas Davenport are recognized.

Reports were typed by Word Processing under the direction of Norma Kraus and Diane Woodyard while Field Observations and Lake Assessment Summaries were typed by Betty Pennington, Lori Whalen, Karen Janssen, and Marilyn Budd.

INTRODUCTION

A cooperative volunteer lake monitoring effort was initiated by the Illinois EPA in 1981 as part of an overall self-help, service program being developed for lakes. In addition to expanding the Agency's lakes data base with information on present water quality and trends, the program was designed to involve citizens in learning about a lake so they could make more informed decisions regarding its use, protection, and enhancement.

Citizens selected a lake they were concerned about and were trained to measure water clarity or transparency by recording the depth to which a Secchi disc (an eight-inch diameter metal plate painted black and white in alternating quadrants) was visible. They also measured total depth and recorded field observations from a boat at three sites on their chosen lake. Readings were to be taken twice a month from May through October and reported to the Agency on special data forms. The Secchi disc, data forms, and postage paid envelopes were provided by the Agency. Volunteers were required to have available a boat with an anchor to perform the monitoring.

Approximately 140 volunteers participated in monitoring 87 lakes in 1981. The sampling data were computerized to facilitate analyses and preparation of tables and graphs for reports. A statewide report entitled, "Volunteer Lake Monitoring, 1981", summarized all the data for the volunteer lakes. Individual reports were also prepared for each of the 87 lakes monitored by volunteers in 1981.

BACKGROUND

Sutton Place Lake is a 1.0 acre lake owned by the Village of Lincolnshire, Lake County, Illinois. The lake is a retention basin constructed in 1977 that has an average depth of 4 feet. The lake is aerated and has problems associated with fluctuating water levels. (Table 1)

Assessment and monitoring information on Sutton Place Lake was provided by the Village of Lincolnshire. Secchi disc transparency and total depth was recorded at three sites (located in Fig. 1) on May 26, 1981, while field observations were recorded on six dates.

RESULTS AND DISCUSSION

In this section, monitoring results will be presented for the lake and compared to those for other lakes in the volunteer program. Then spatial (within lake) and seasonal differences in transparency will be examined and related to field observations. Results will also be discussed in terms of lake uses. For an explanation of unfamiliar terms or concepts presented here, refer to the report, "Volunteer Lake Monitoring, 1981", Section IV, "Understanding Illinois' Lakes".

TABLE 1. LAKE ASSESSMENT SUMMARY, SUTTON PLACE LAKE, LAKE COUNTY, ILLINOIS (RH-A01-N)

I. GENERAL INFORMATION

River Basin: Chicago-Calumet
Segment: A01

Ownership: Organizational

Surface Area (Acres): 1.0
Watershed Area (Acres):
Maximum Depth (Feet):
Average Depth (Feet): 4.0
Storage Capacity (Acre/Feet):
Inflowing Stream(s):
Outflowing Stream(s):
Water Retention Time:
Lake Type: Retention Basin
Year Constructed: 1977

II. USAGE

Public Access:

Lake Usage:

Potable Water Supply:
Industrial Water Supply:
Agricultural Water Supply:
Cooling Water:
Recreation:
Fishing:
Swimming:
Power Boating:
Row Boating or Canoeing:
Sailboating:
Camping:
Picnicking:
Waterfowl Hunting:
Waterfowl Observation:
Other:

Recreational Facilities:

Shoreline Usage (Percent):

Urban (Including Streets):
Residential (Including Lawns):
Golf Courses:
Pasture or Grassland:
Woodland:
Row Crops:
Wetland:
Other:

Watershed Usage (Percent):

Urban:
Residential:
Golf Courses:
Pasture or Grassland:
Woodland:
Row Crops:
Wetland:
Other:

III. WATER QUALITY AND PROBLEMS

General Water Quality:

Fishing:

Conditions and Extent:

Suspended Sediment:
Deposition of Sediment:
Algal Blooms:
Aquatic Weeds:
Taste and/or Odor:
Water Level Fluctuation: moderate
Fishkills:
Other:

IV. CAUSES OF WATER QUALITY PROBLEMS

Potential Pollution Sources:

Sewage Treatment Plant Effluent:
Industrial Discharge:
Urban Storm Drainage:
Septic Tanks:
Pasture or Grassland Runoff:
Cropland Runoff:
Feedlot Runoff:
Construction Site Runoff:
Fertilizer or Pesticides from
Lawns/Golf Courses:
Orchards:
Forestry Operations Runoff:
Mining:
Waterfowl:
Sediment in Lake:
Other:

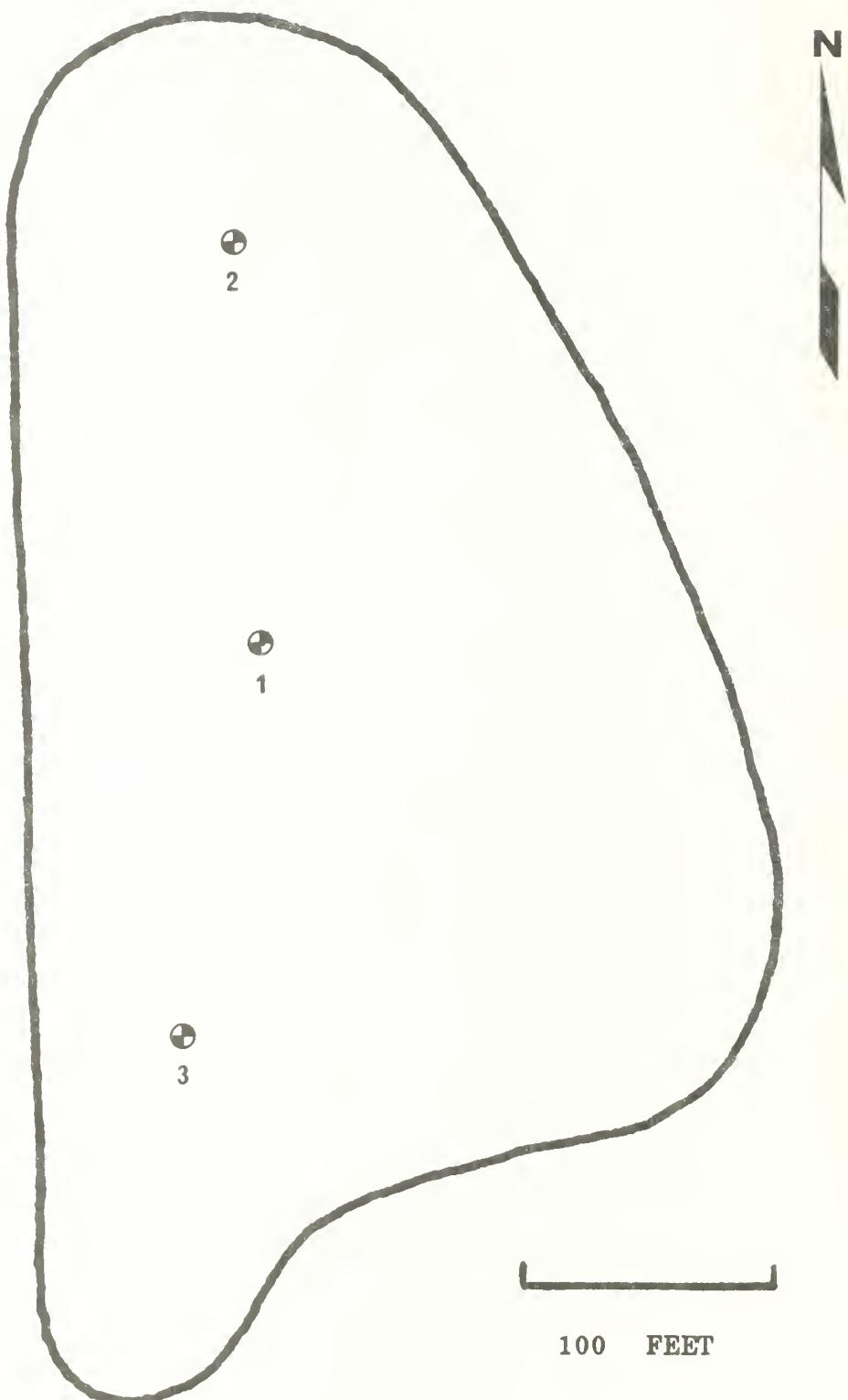
V. LAKE MANAGEMENT

Comments: aerated

*Information Supplied By Terry Williams, Village of Lincolnshire (1981)

FIGURE 1

SUTTON PLACE LAKE
LAKE COUNTY



The Secchi monitoring data for Sutton Place Lake are summarized in Table 2 and plotted in Figure 2. Total depth data are provided in Table 3 while field observations are summarized in Table 4.

Transparency of Sutton Place Lake

The average Secchi disc transparency of Sutton Place Lake was 24.0 inches, which ranked number 56 when the average transparencies of the lakes were ranked from clearest (number 1 at 137.8 inches) to least transparent (number 87 at 7.3 inches). This average transparency was less than the four feet minimum recommended for swimming by the Illinois Department of Public Health (1976). However, it was in the normal range for Illinois lakes and was compatible with most recreational uses. The low readings were probably related, in part to the shallow depth of the lake, which allowed wind and wave activity to resuspend the bottom sediments.

Field observations of a moderately brown to greenish-brown to yellowish water color indicate that the transparency of Sutton Place Lake in summer is influenced by the presence of algae and sediment.

Relationship to Lake Uses

Secchi disc transparency may indicate the potential of the lake for exhibiting water quality and use impairment problems. It may also help a fisherman locate the most likely fish habitat.

Generally, from the surface to between two and five times the Secchi disc depth can be considered the euphotic (lighted) zone of the lake; in this region there is enough light to allow plants to survive and produce oxygen by photosynthesis. This is also the zone of greatest fish activity. Waters below the euphotic zone can be expected to have little or no dissolved oxygen during the summer if the lake is thermally stratified (has layers of water of different temperatures). During this stratification period, fish will probably be limited to the euphotic or aerobic (oxygenated) zone of the lake.

The lower limit of the euphotic zone of Sutton Place Lake (estimated at twice the Secchi depth) was four feet on May 26. Since the euphotic zone of generally less than the total depth, low oxygen may be expected in the bottom waters. In recognition of this problem, an aerator has been installed in the lake.

TABLE 2

| SEECHEI DISC TRANSPARENCY (INCHES) SUTTON PLACE/LAKE COUNTY, ILLINOIS (VOLUNTEER DATA 1981) | | | | | | |
|---|----------------|----------------|----------------|--------------|----------------|----------------|
| DATE | SITE 1 24.0 | SITE 2 24.0 | SITE 3 24.0 | MEAN 24.0 | STD DEV 0.0 | STD DEV 0.0 |
| SITES | | | | | | |
| MEAN | 24.0 | 24.0 | 24.0 | 24.0 | 0.0 | 0.0 |
| STD DEV | -1.0 | -1.0 | -1.0 | 0.0 | 0.0 | 0.0 |
| MIN | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 |
| MAX | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 |
| AV DEPTH | 8.0 | 10.0 | 10.0 | 9.0 | 4.0 | 4.0 |

-1 = missing value

See glossary for explanation of Summary Statistics

TABLE 3

| DEPTH OF SITE (FEET) SUTTON PLACE/LAKE COUNTY, ILLINOIS (VOLUNTEER DATA 1981) | | | | | | |
|---|---------------|----------------|---------------|-------------|----------------|----------------|
| DATE | SITE 1 8.0 | SITE 2 10.0 | SITE 3 4.0 | MEAN 7.3 | STD DEV 3.1 | STD DEV 3.1 |
| SITES | | | | | | |
| MEAN | 8.0 | 10.0 | 4.0 | 7.3 | 3.1 | 3.1 |
| STD DEV | -1.0 | -1.0 | -1.0 | 4.0 | 4.0 | 4.0 |
| MIN | 8.0 | 10.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| MAX | 8.0 | 10.0 | 4.0 | 10.0 | 10.0 | 10.0 |
| AV DEPTH | 8.0 | 10.0 | 4.0 | 7.3 | 3.1 | 3.1 |

-1 = missing value

See glossary for explanation of Summary Statistics.

FIGURE 2

SECCHI DISC TRANSPARENCY (INCHES) SUTTON PLACE/LAKE COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

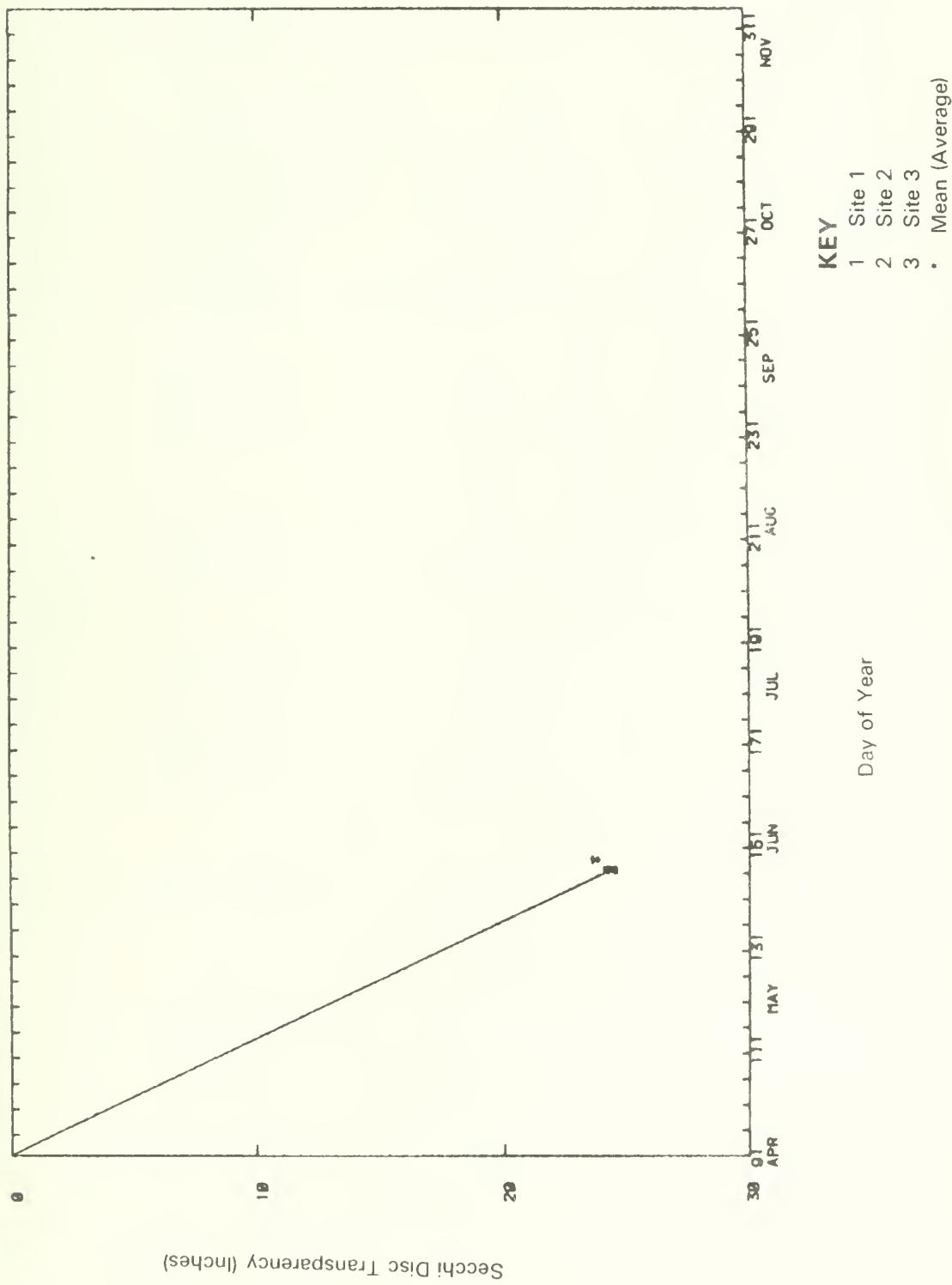


TABLE 4. FIELD OBSERVATIONS, SUTTON LAKE, LAKE COUNTY, ILLINOIS.

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|---------|---|--|--|--|--|--|---|--|
| 5/26/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | mod. brown minimal slight minimal minimal none no odor | mod. brown minimal slight minimal minimal none no odor | mod. brown minimal slight minimal minimal none no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: OBSERVATIONS MADE BY: | clear no rain calm warm E Terry M. Williams | clear no rain calm warm E | WATER LEVEL OF LAKE: RECREATIONAL USAGE: LAKE MANAGEMENT: ADDITIONAL COMMENTS: put aerator in lake |
| 6/12/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | grnsh-brn minimal minimal minimal minimal none no odor | grnsh-brn minimal minimal minimal minimal none no odor | grnsh-brn minimal large minimal minimal none no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: OBSERVATIONS MADE BY: | overcast no rain calm warm SE Village of Lincolnshire | clear no rain calm warm | WATER LEVEL OF LAKE: RECREATIONAL USAGE: LAKE MANAGEMENT: ADDITIONAL COMMENTS: |
| 6/30/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | brnsh-grn minimal minimal minimal minimal none no odor | brnsh-grn minimal minimal minimal minimal none no odor | brnsh-grn slight minimal minimal minimal none no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: OBSERVATIONS MADE BY: | overcast no rain calm warm NE Village of Lincolnshire | few clouds no rain calm warm SW | WATER LEVEL OF LAKE: RECREATIONAL USAGE: LAKE MANAGEMENT: ADDITIONAL COMMENTS: |
| 7/13/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | brnsh-grn minimal minimal minimal minimal slight musty | brnsh-grn minimal minimal minimal minimal none musty | brnsh-grn minimal minimal minimal minimal slight algal mats musty | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: OBSERVATIONS MADE BY: | overcast no rain calm very hot NE Village of Lincolnshire | few clouds no rain calm very hot NW | WATER LEVEL OF LAKE: RECREATIONAL USAGE: LAKE MANAGEMENT: ADDITIONAL COMMENTS: |

TABLE 4. FIELD OBSERVATIONS, SUTTON LAKE, LAKE COUNTY, ILLINOIS.

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|---------|---|---|---|--|---|---|--|---|
| 7/30/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | yellowish minimal slight minimal moderate none | grnsh-brn minimal minimal minimal minimal none | yellowish minimal slight minimal minimal none | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | few clouds no rain calm warm SW | clear no rain calm warm NE | WATER LEVEL OF LAKE: RECREATIONAL USAGE: LAKE MANAGEMENT: ADDITIONAL COMMENTS: |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|---------|---|---|---|---|---|--|---|---|
| 8/11/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | brnsh-grn minimal slight minimal slight none | grnsh-brn minimal minimal minimal minimal none | yellowish minimal slight minimal slight none | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | clear no rain calm warm SW | few clouds no rain calm hot S | WATER LEVEL OF LAKE: RECREATIONAL USAGE: LAKE MANAGEMENT: ADDITIONAL COMMENTS: |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|---------|---|---|---|---|---|--|---|---|
| 8/11/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | brnsh-grn minimal slight minimal slight none | grnsh-brn minimal minimal minimal minimal none | yellowish minimal slight minimal slight none | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | clear no rain calm warm SW | few clouds no rain calm hot S | WATER LEVEL OF LAKE: RECREATIONAL USAGE: LAKE MANAGEMENT: ADDITIONAL COMMENTS: |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|---------|---|---|---|---|---|--|---|---|
| 8/11/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | brnsh-grn minimal slight minimal slight none | grnsh-brn minimal minimal minimal minimal none | yellowish minimal slight minimal slight none | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | clear no rain calm warm SW | few clouds no rain calm hot S | WATER LEVEL OF LAKE: RECREATIONAL USAGE: LAKE MANAGEMENT: ADDITIONAL COMMENTS: |

SUMMARY AND RECOMMENDATIONS

Summary

Sutton Place Lake, a residential development lake in northeastern Illinois, was sampled on May 26, 1981 under the Illinois EPA's Volunteer Lake Monitoring Program. Volunteers from the Village of Lincolnshire recorded Secchi disc transparency, total depth, and field observations at three sites and reported results to the Illinois EPA.

The average Secchi disc transparency of Sutton Place Lake was 24.0 inches, which ranked 56th of the 87 lakes monitored by volunteers in 1981 (rank 1 is clearest, rank 87 is least transparent). Although this average transparency was less than the four feet minimum recommended for swimming by the Department of Public Health, it was in the normal range for Illinois lakes and was compatible with most recreational uses.

Transparency was similar at the three sites on May 26. Field observations indicated that the transparency was influenced by algae and sediment.

Sutton Place Lake is undergoing the process of eutrophication, as evidenced by transparency readings and field observations of algae, weed, and sediment problems. Protection from further degradation is critical. If nutrient and sediment inputs were controlled, lake quality would probably improve; failure to control inputs will probably result in continued rapid eutrophication. Lake managers should identify sources of nutrient and sediment input and take steps to control them before the lake becomes further degraded.

Recommendations

Developing a management plan for a lake requires a comprehensive assessment of the lake and watershed and is beyond the scope of this project. However, some suggestions regarding lake management are presented below for consideration; their applicability to this lake would require further study. Alternative options not presented here may also apply.

Information of lake water levels is important for determining lake management strategies. Installation of a simple, but accurate, water level measuring device and frequent recording of lake water levels is recommended.

Lake managers should work with the Soil and Water Conservation District and the Soil Conservation Service to develop a procedure to identify and quantify non-point pollution source areas. This procedure should allow for the targeting of resources and programs to correct the identified problems.

Installation of Resource Management Systems in identified source areas of the watershed, particularly those closest to the lake, may reduce nutrient and sediment transport to the lake. Stabilization of the lake shoreline by riprap or some other means may also reduce sediment input.

Continued monitoring is recommended for Sutton Place Lake. Consistent data gathered over a period of years is necessary to document and evaluate water quality trends, identify problems, and evaluate lake watershed management strategies.

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DS:jab/sp4563C

GLOSSARY*

acre-foot - the volume of water required to cover one acre to a depth of one foot and equal to 0.3258 million gallons; a unit of storage capacity obtained by multiplying surface area (in acres) by average depth (in feet).

aeration-destratification - the addition of air to the water through mechanical means to increase the dissolved oxygen content of the bottom waters of lakes by eliminating thermal stratification and homogenizing the entire water column.

aerobic - conditions characterized by the presence of oxygen.

algae - one-celled or colonial photosynthetic plants (usually microscopic), found suspended in water or attached to damp rocks or other substrates.

algal bloom - a large number of planktonic algae, which often turns the water green and may produce objectionable scums and odors; a condition in which algae cloud the water noticeably.

ambient - existing condition or level at the time and place.

ammonia - a colorless, gaseous, alkaline compound which is a decompositional end product of nitrogen-containing organic matter; its importance in fresh water is associated with its toxicity to aquatic organisms and its use as a nutrient for aquatic plant growth.

anaerobic - conditions characterized by the absence of oxygen.

anoxic - without oxygen.

aquatic - growing or living in water; pertaining to water.

aquatic weeds - larger plants easily visible to the naked eye which are submergent, floating or emergent in the water.

artificial - man-made; constructed.

average depth - mean depth of a lake, calculated by dividing the volume (storage capacity) by the surface area.

backwater (or river backwater) - water impoundment located along the side of a stream or river which may flood periodically or have a direct connection to the stream at all times.

blue-green algae - a group of one celled or colonial plants of the phylum Cyanophyta, which live in water or damp places and reflect a blue to dark green tint; most often responsible for nuisance algal blooms with scum and odors.

borrow pit - a water impoundment formed by removal of earth for fill construction in the making of roads, dikes, bridges and levees

bottomland lake - natural water impoundment located in a river floodplain

circulation period - mixing period for a lake; period of time in which the entire lake volume is not thermally stratified and is totally mixed by wind action.

condition - the overall quality of the lake for supporting general use

detritus - finely divided organic and inorganic settleable material suspended in the water

diatoms - a group of one-celled or colonial algae living in water or damp places which are characterized by the presence of yellow-green or brown pigments and cell walls which contain silica and are composed of two halves (valves), one overlapping the other like the top and bottom of a pill box

drainage area - watershed; the land surface surrounding the lake which contributes water via surface runoff to the the lake

ecology - the study of the relationship of organisms to their environment

emergent - a rooted aquatic plant with parts normally extending above the water surface

epilimnion - upper, relatively warm, circulating zone of water in a thermally stratified lake

euphotic zone - region of a lake where light penetration is sufficient to maintain photosynthesis; its lower limit is generally two to five times the Secchi disc transparency.

eutrophic - waters which are rich in plant nutrients and capable of supporting high biological productivity; USEPA defines a eutrophic lake as one that exhibits any of the following characteristics: biomass accumulations of primary producers (algal blooms and excessive aquatic weeds); rapid organic or inorganic sedimentation and shallowing; or seasonal dissolved oxygen deficiencies in the bottom waters and subsequent shift in species composition of aquatic fauna to forms that can tolerate lower concentrations of oxygen.

eutrophication - lake aging trhough nutrient enrichment and sedimentation.

fertile - waters rich in plant nutrients.

glacial lake - body of standing water formed by glacial action.

green algae - a group of one-celled or colonial plants of the phylum Chlorophyta, which live in water or damp areas and reflect a greenish tint.

hydrogen sulfide - a gaseous compound produced under anaerobic conditions which has a rotten egg smell.

hypolimnion - lower, relatively cold, noncirculating zone in a thermally stratified lake.

impairment - that which damages or negatively impacts the present or potential use of a body of water.

impoundment - a body of standing water constructed by artificial means or formed by nature.

in-lake treatment or control techniques - methods to limit the availability of pollutants already in the lake or to accelerate their outflow; and various physical, chemical and biological approaches for managing the consequences of degradation and enhancing the usability of the lake without controlling the source of the degradation.

iron - an essential micronutrient, which is considered objectionable in water supplies because it can cause taste and odor problems and stain laundry.

lake - a body of standing water 6.0 acres or more in surface area (as defined by the Illinois Department of Conservation).

lake code - an eight-digit combination of letters and numbers used to identify a lake in the computer.

limnologist - aquatic ecologist; one who studies the physical, chemical, and biological aspects of lakes.

limnology - the study of the ecology of inland lakes.

littoral - shoreward region of a body of water.

macrophyte - large plant of macroscopic size (easily visible to the naked eye).

management - non-structural measures designed to enhance the quality and usability of a lake.

manganese - an essential micronutrient, which is considered objectionable at high concentrations because it can cause taste and odor problems.

maximum (max) - highest (largest) value observed in a data set.

maximum depth - depth of deepest point in a lake.

mean - a statistical term for average, calculated by totalling the values and dividing by the number of observations.

mean depth - the volume of a lake divided by its surface area; average depth.

mesotrophic - waters intermediate in character between oligotrophic and eutrophic; moderately well supplied with plant nutrients and capable of supporting moderate biological productivity.

minimum (min) - smallest (lowest) value observed in a data set.

mixing period - circulation period of a lake; period of time in which the lake is not thermally stratified and is totally mixed by wind action.

nitrogen - an element which is an essential plant nutrient and is one of the principal elemental constituents of proteins.

nonpoint pollution - pollution from diffuse sources (e.g., agriculture, forestry operations, mining, construction) for which a specific point of discharge cannot be readily identified.

nutrient - any chemical element, ion or compound that is required by an organism for the continuation of growth, reproduction and other life processes; nitrogen and phosphorus are usually growth limiting factors for aquatic plants.

oligotrophic - waters with low concentrations of plant nutrients and hence capable of supporting little biological productivity.

organizational impoundment - body of standing water owned, leased or maintained by an organization of six or more members (as defined by the Illinois Department of Conservation).

phosphorus - an element which is an essential plant nutrient and plays a vital role in the energy transfer during cell metabolism.

photosynthesis - the process by which green plants use the sun's energy to convert dioxide and water into chemical energy (carbohydrates, fats, and proteins).

phytoplankton - microscopic plants (algae) that drift passively in open water regions of lakes and rivers.

plankton - the community of microscopic plants and animals that drift passively in open water regions of lakes and rivers.

point source pollution - pollution emanating from a discharge point such as a pipe which can be specifically identified (e.g., sewage treatment plants, manufacturing plants).

pollution - any substance which makes another unclean or impure.

pond - small body of standing water less than 6.0 acres in surface area (as defined by the Illinois Department of Conservation).

potable - of quality for drinking.

private impoundment - body of standing water privately owned or leased with no fee charged for use (as defined by the Illinois Department of Conservation).

production - total amount of living matter produced in a lake per unit time.

productivity - rate at which organic material (and energy) is produced and transferred through organisms in an ecosystem; standing crop of organisms that can be supported.

protection - pollution abatement or control; measures to prevent pollution from entering a lake, including methods to stop the pollution at its source or to treat it before it reaches the lake.

public access - publicly owned contiguous land or easements providing any member of the public the same or equivalent opportunity to enjoy privileges and benefits of the lake as any other member of the public or as any resident around the lake.

public impoundment - body of standing water owned and maintained by a governmental agency (excluding the Illinois Department of Conservation) that have public access.

public water supply - used as a municipal water supply for domestic needs.

Resource Management Systems - best management practices for the control and abatement of nonpoint pollution; a combination of agricultural practices which reduce soil erosion and/or increase water retention.

restoration - structural measures designed to return a lake to its original condition (e.g., dredging to original depth).

reservoir - a watershed impoundment artificially constructed by damming of a stream.

resuspend - cause to be suspended in the water.

river basin - drainage area for a large river.

seasonal - over a period of time (seasonal).

Secchi disc - an eight-inch diameter weighted metal plate painted black and white in alternating quadrants which is lowered into the water on a calibrated line to measure the transparency or clarity of the water.

Secchi disc depth - the depth into the water to which a black and white circular disc can be seen when viewed from the surface; a measure of water transparency or its ability to allow vertical light penetration.

sediment - the solid materials (particulate matter) transported by, suspended in or deposited from, water; includes fragmentary material that originates from weathering of rock, chemical and biochemical precipitants and decomposed organic material such as humus.

sediment-related turbidity - muddiness; cloudiness or opaqueness of the water caused by suspended sediment.

sedimentation - deposition of organic and/or inorganic particulate matter.

sedimentation surveys - measurement of the amount of sediment deposited in a water body.

segments - a subwatershed within a large river basin.

spatial - differences over an area.

standard deviation (Std. Dev.) - a statistical term to describe the variability of the data around the mean (average); if the magnitude of the standard deviation is "small" relative to the mean, then most of the values are close to the mean in magnitude and the data has little variability (is relative uniform); if the standard deviation is large in magnitude relative to the mean, then the data is more variable.

state impoundment - a body of standing water owned or leased and maintained by the Illinois Department of Conservation.

storage capacity - volume of water an impoundment can hold; often expressed in acre-feet, million gallons, and cubic meters.

submergent - an aquatic plant that lives and grows entirely below the surface of the water.

succession - in ecology, the progressive change of plant and animal life in an area.

suspended sediment - the sediment that at any given time is maintained in suspension by current or as a colloid.

suspended solids - particulate material that at any given time is maintained in suspension by current or as a colloid; total suspended solids are all suspended particulate material, volatile and non-volatile, organic and inorganic; volatile suspended solids is that suspended particulate material, generally organic in nature, which undergoes combustion at a temperature of 600°C.

suspension - a heterogenous mixture in which the particles of one substance are kept dispersed by agitation.

thermal stratification - the layering of the water in a lake due to different densities as a function of temperature; the layers are the epilimnion (upper), metalimnion or thermocline (middle), and the hypolimnion (lower).

thermocline - metalimnion; the middle layer of water in a thermally stratified lake in which temperature decreases rapidly with increasing depth.

transparency - ability to allow light penetration and be seen through; clarity.

trophic state - the degree of eutrophication of a lake; the rate of primary biological production it is capable of supporting.

turbid - cloudy, opaque, murky, dirty-looking; containing suspensoids (organic or inorganic) which interfere with light penetration.

turbidity - amount of scattering of light caused by material suspended in the water.

use impairment - that which damages or negatively impacts the present or potential use of a body of water.

water quality - the suitability of the water for supporting various uses.

water retention time - water residence time; period of time a mass of water remains in an impoundment.

watershed - drainage area; the land surface surrounding the lake which contributes water, via surface runoff, to the lake; the total or contributing watershed area is the total draining to the lake, including the lake surface area; the immediate or net watershed is the portion of the total watershed (free of lakes or sloughs) from which direct, unimpeded surficial runoff drains to the lake.

zooplankton - animal portion of the community of suspended or floating organisms which drift passively with the water currents.

ABBREVIATIONS AND SYMBOLS

av - average
brn - brown
brnsh-grn - brownish-green
grn-brn - green-brown
grnsh-brn - greenish-brown
lt - light
max - maximum value
min - minimum value
mod - moderately
std. dev. - standard deviation
v - very

Explanatory example of lake code:

Anderson Lake

D = Illinois River Basin


denotes lake as opposed to stream
basin segment
and sub-segment
RD-B05-A
letter denoting specific lake
within a basin segment
basin code

*Definitions of items in sense used in text

DS:sp,6207a,1-8

UNIVERSITY OF ILLINOIS-URBANA
551.482V889X C002
VOLUNTEER LAKE MONITORING PROGRAM SPRIN
1981:73



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1981 VOLUNTEER LAKE MONITORING PROGRAM REPORT

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Lake Sunset / Lee Co.

1981 VOLUNTEER LAKE MONITORING PROGRAM REPORT
FOR
LAKE SUNSET, LEE COUNTY, ILLINOIS

A Cooperative Citizen -
Illinois Environmental Protection Agency
Project

May, 1982
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706

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Illinois EPA's Ambient Monitoring Unit, Planning Section, Division of Water Pollution Control, under the direction of Kenneth R. Rogers, was responsible for the design and implementation of the program, as well as preparation of this report. Substantial assistance was provided by the Agency's Public Participation Section supervised by Gloria Craven.

Program coordination was provided by Donna Sefton for the Illinois EPA's Ambient Monitoring Unit and Carol Beim for the Public Participation Section.

Volunteers were trained by Public Participation Coordinators Carol Beim, Bob Hagele, William Hammel, Patrick McCarthy, Vanessa Musgrave, and Dawn Wrobel. Lake maps were prepared by J. W. Hammel and Bob Hagele. Lake assessment summaries were prepared by Patrick McCarthy.

Assessment and monitoring information was provided by approximately 140 volunteers throughout the state.

Data handling was performed by John Little, Jill Hardin, Marilyn Budd, Lori Whalen, Cora Stockton, and Karen Janssen. Data analyses were performed and tabular and graphical outputs obtained by John Little using programs developed for the Tektronix desk top computer terminal by Dr. David J. Schaeffer and Vladimir Chernomordikov.

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Reports were typed by Word Processing under the direction of Norma Kraus and Diane Woodyard while Field Observations and Lake Assessment Summaries were typed by Betty Pennington, Lori Whalen, Karen Janssen, and Marilyn Budd.

INTRODUCTION

A cooperative volunteer lake monitoring effort was initiated by the Illinois EPA in 1981 as part of an overall self-help, service program being developed for lakes. In addition to expanding the Agency's lakes data base with information on present water quality and trends, the program was designed to involve citizens in learning about a lake so they could make more informed decisions regarding its use, protection, and enhancement.

Citizens selected a lake they were concerned about and were trained to measure water clarity or transparency by recording the depth to which a Secchi disc (an eight-inch diameter metal plate painted black and white in alternating quadrants) was visible. They also measured total depth and recorded field observations from a boat at three sites on their chosen lake. Readings were to be taken twice a month from May through October and reported to the Agency on special data forms. The Secchi disc, data forms, and postage paid envelopes were provided by the Agency. Volunteers were required to have a boat with an anchor to perform the monitoring.

Approximately 140 volunteers participated in monitoring 87 lakes in 1981. The sampling data were computerized to facilitate analyses and preparation of tables and graphs for reports. A statewide report entitled "Volunteer Lake Monitoring, 1981", summarized all the data for the volunteer lakes. Individual reports were also prepared for each of the 87 lakes monitored by volunteers in 1981.

BACKGROUND

Lake Sunset, a 7 acre impoundment owned by the Woodhaven Association, is located approximately 6 miles west of Sublette, in Lee County, Illinois. The impoundment, which was constructed by the damming of an unnamed creek in 1974, has a maximum depth of 10 feet, an average depth of 6 feet, and a storage capacity of 44 acre-feet (Table 1).

Lake Sunset serves as a recreational lake. Fishing is the major type of recreational use, with some rowboating and canoeing occurring. Access is limited to organization members and their guests. A large gravel access area is located on the southeast shore of the lake.

The watershed drainage area of Lake Sunset is estimated to be 80 percent residential. The lake shoreline is also mainly residential.

Algal blooms and aquatic weeds are considered to be moderate problems for Lake Sunset. Watershed characteristics of sandy soils and limited vegetation contribute to these problems.

Assessment and monitoring information on Lake Sunset was provided by Lisa Brooks, Aquatic Biologist. Secchi disc depth, total depth and field observations were recorded at three sites (located in Figure 1) on ten dates in 1981.

TABLE 1. LAKE ASSESSMENT SUMMARY, LAKE SUNSET, LEE COUNTY, ILLINOIS (RP-A06-L).

I. GENERAL INFORMATION

River Basin: Rock
Segment: A06

Ownership: Woodhaven Association; Sublette, IL

Surface Area (Acres): 7.24

Watershed Area (Acres):

Maximum Depth (Feet): 10

Average Depth (Feet): 6

Storage Capacity (Acre/Feet): 44.23

Inflowing Stream(s):

Outflowing Stream(s):

Water Retention Time:

Lake Type: dammed stream

Year Constructed: 1974

II. USAGE

Public Access: no-organization members and guests only

Lake Usage:

Potable Water Supply: none

Industrial Water Supply: none

Agricultural Water Supply: none

Cooling Water: none

Recreation:

Fishing: heavy

Swimming: none

Power Boating: none

Row Boating or Canoeing: moderate

Sailboating: none

Camping: none

Picnicking: none

Waterfowl Hunting: none

Waterfowl Observation: none

Other:

Recreational Facilities:

Shoreline Usage (Percent):

Urban (Including Streets): 10%

Residential (Including Lawns): 82%

Golf Courses:

Pasture or Grassland: 8%

Woodland:

Row Crops:

Wetland:

Other:

Watershed Usage (Percent):

Urban:

Residential: 80%

Golf Courses:

Pasture or Grassland: 15%

Woodland:

Row Crops: 5%

Wetland:

Other:

III. WATER QUALITY AND PROBLEMS

General Water Quality: fair

Fishing: fair

Conditions and Extent:

Suspended Sediment: slight

Deposition of Sediment: minimal

Algal Blooms: moderate

Aquatic Weeds: moderate

Taste and/or Odor: minimal

Water Level Fluctuation: minimal

Fishkills: minimal

Other:

IV. CAUSES OF WATER QUALITY PROBLEMS

Potential Pollution Sources:

Sewage Treatment Plant Effluent:

Industrial Discharge:

Urban Storm Drainage:

Septic Tanks:

Pasture or Grassland Runoff:

Cropland Runoff: yes

Feedlot Runoff:

Construction Site Runoff:

Fertilizer or Pesticides from Lawns/Golf Courses: yes

Orchards:

Forestry Operations Runoff:

Mining:

Waterfowl:

Sediment in Lake:

Other:

Watershed around lake-sandy soils, limited vegetation

V. LAKE MANAGEMENT

Comments: 6/80 & 9/80 50# fathead minnows added;

Summer '81-50# fathead minnows added monthly May-Sept.

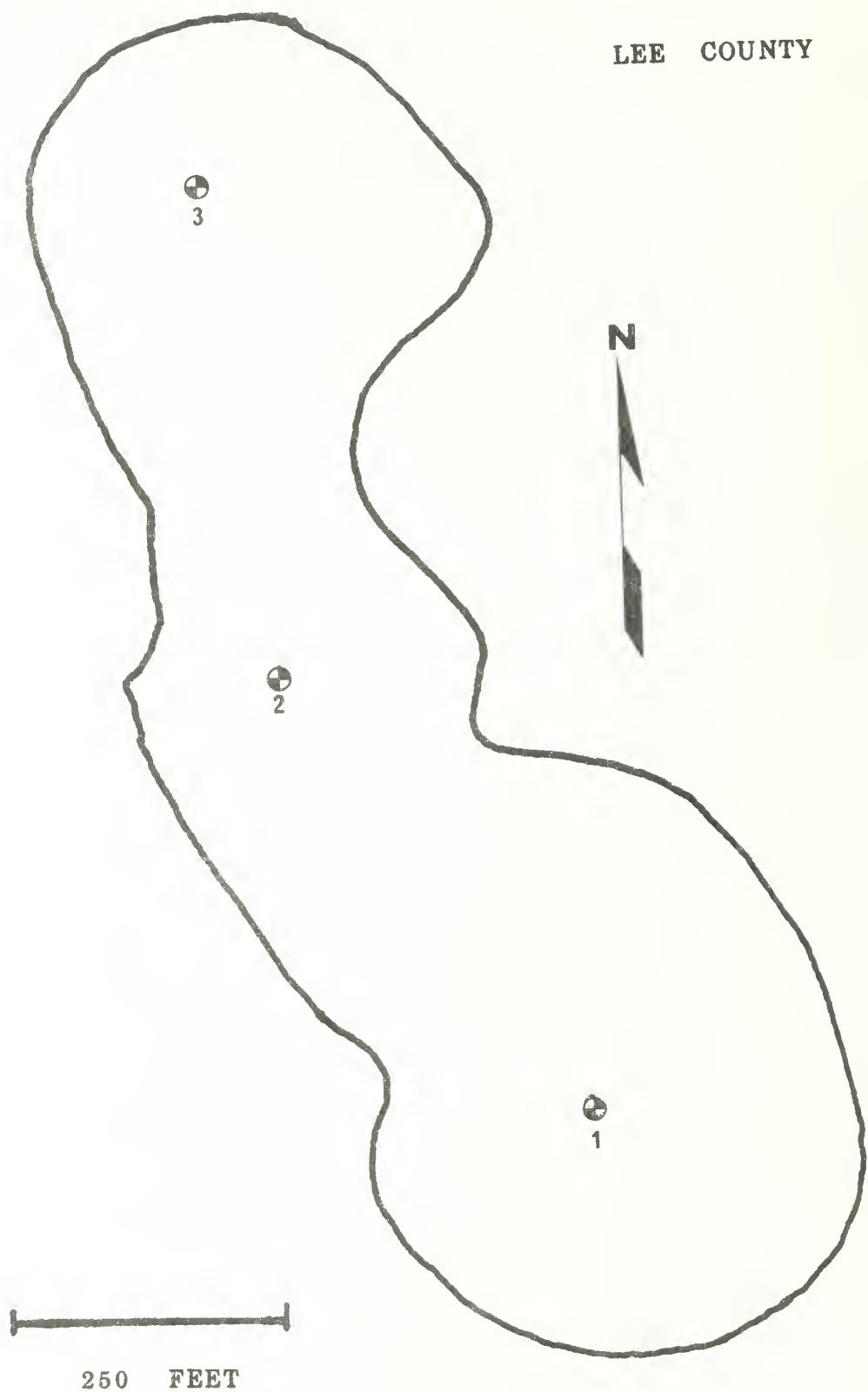
Summer '81-mechanical harvesting of aquatic weeds

with CHUB; fall '79 Aerator installed.

FIGURE 1

LAKE SUNSET

LEE COUNTY



RESULTS AND DISCUSSION

In this section, monitoring results will be presented for the lake and compared to those for other lakes in the volunteer program. Then spatial (within lake) and seasonal differences in transparency will be examined and related to field observations. Results will also be discussed in terms of lake uses. For an explanation of unfamiliar terms or concepts presented here, refer to the report "Volunteer Lake Monitoring, 1981", Section IV "Understanding Illinois' Lakes."

The Secchi monitoring data for Lake Sunset are summarized in Table 2 and plotted in Figure 2. Total depth data are provided in Table 3, while field observations are summarized in Table 4.

Transparency of Lake Sunset

The average Secchi disc transparency of Lake Sunset was 81.2 inches, which ranked number 9 when the average transparencies of the volunteer lakes were ranked from clearest (number 1 at 137.8 inches) to least transparent (number 87 at 7.3 inches). This average transparency was greater than the four feet minimum recommended for swimming by the Illinois Department of Public Health (1976) and was above average for Illinois lakes.

Spatial and Seasonal Differences in Transparency

The transparency of Lake Sunset ranged from a minimum of 48 inches at all three sites on August 22 to a maximum of 96 inches at Site 1 on June 30 and October 19 and at Site 2 on May 15 and June 30. Secchi readings were greater than the four feet minimum recommended for swimming on all sampling dates.

The clarity of Lake Sunset was relatively high at all three sites. Transparency averaged 83.4 inches, 82.8 inches, and 77.4 inches at Sites 1, 2, and 3, respectively. These values were about equal to the total depths of the sites (7.7 feet at Site 1, 7.9 feet at Site 2 and 7.8 feet at Site 3).

High Secchi transparencies were found throughout the sampling period except on August 22, which had a reading of 48 inches. Field observations indicate that the lower transparency on this date was primarily due to suspended sediment. A greenish-brown water color and moderate amounts of suspended sediment were noted.

TABLE 2

SECCO DISC TRANSPARENCY (INCHES) SUNSET/LEE COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

| DATE | SITE 1 | SITE 2 | SITE 3 | MEAN | STD DEV |
|--------|--------|--------|--------|------|---------|
| 05/ 15 | 87 0 | 96 0 | 93 0 | 92 0 | 4 6 |
| 05/ 31 | 84 0 | 78 0 | 84 0 | 82 0 | 3 5 |
| 06/ 30 | 96 0 | 96 0 | 92 0 | 92 0 | 6 0 |
| 07/ 12 | 72 0 | 99 0 | 84 0 | 82 0 | 9 2 |
| 07/ 29 | 93 0 | 90 0 | 78 0 | 87 0 | 7 0 |
| 08/ 09 | 93 0 | 93 0 | 81 0 | 86 0 | 6 2 |
| 08/ 22 | 48 0 | 48 0 | 48 0 | 48 0 | 0 0 |
| 08/ 15 | 90 0 | 72 0 | 54 0 | 72 0 | 16 8 |
| 10/ 08 | 78 0 | 75 0 | 78 0 | 77 0 | 1 7 |
| 10/ 20 | 96 0 | 99 0 | 98 0 | 92 0 | 3 5 |

SUMMARY STATISTICS

| | SITES | LAKE |
|----------|-------|------|
| MEAN | 83.4 | 82 0 |
| STD DEV | 14 6 | 15 0 |
| MIN | 48 0 | 48 0 |
| MAX | 96 0 | 96 0 |
| AV DEPTH | 7 7 | 7 8 |

-1 = missing value

See glossary for explanation of Summary Statistics.

TABLE 3

DEPTH OF SITE (FEET) SUNSET/LEE COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

| DATE | SITE 1 | SITE 2 | SITE 3 | MEAN | STD DEV |
|--------|--------|--------|--------|------|---------|
| 05/ 15 | 7 5 | 8 0 | 8 0 | 7 8 | 0 3 |
| 05/ 31 | 7 0 | 6 5 | 7 0 | 6 9 | 0 3 |
| 06/ 30 | 6 0 | 8 0 | 7 0 | 7 0 | 0 6 |
| 07/ 12 | 7 5 | 7 5 | 7 0 | 7 3 | 0 3 |
| 07/ 20 | 8 0 | 7 5 | 7 8 | 7 8 | 0 3 |
| 08/ 09 | 7 5 | 6 0 | 6 0 | 6 5 | 0 5 |
| 08/ 22 | 8 0 | 8 0 | 8 0 | 8 0 | 0 0 |
| 09/ 15 | 7 5 | 8 0 | 8 0 | 7 8 | 0 3 |
| 10/ 08 | 8 0 | 8 0 | 8 0 | 8 0 | 0 0 |
| 10/ 20 | 8 0 | 8 0 | 8 0 | 8 0 | 0 0 |

SUMMARY STATISTICS

| | SITES | LAKE |
|----------|-------|------|
| MEAN | 7 7 | 7 0 |
| STD DEV | 2 3 | 0 6 |
| MIN | 7 0 | 6 5 |
| MAX | 8 0 | 8 0 |
| AV DEPTH | 7 7 | 7 0 |

-1 = missing value

See glossary for explanation of Summary Statistics.

FIGURE 2

SECCHI DISC TRANSPARENCY (INCHES) SUNSET/LEE COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

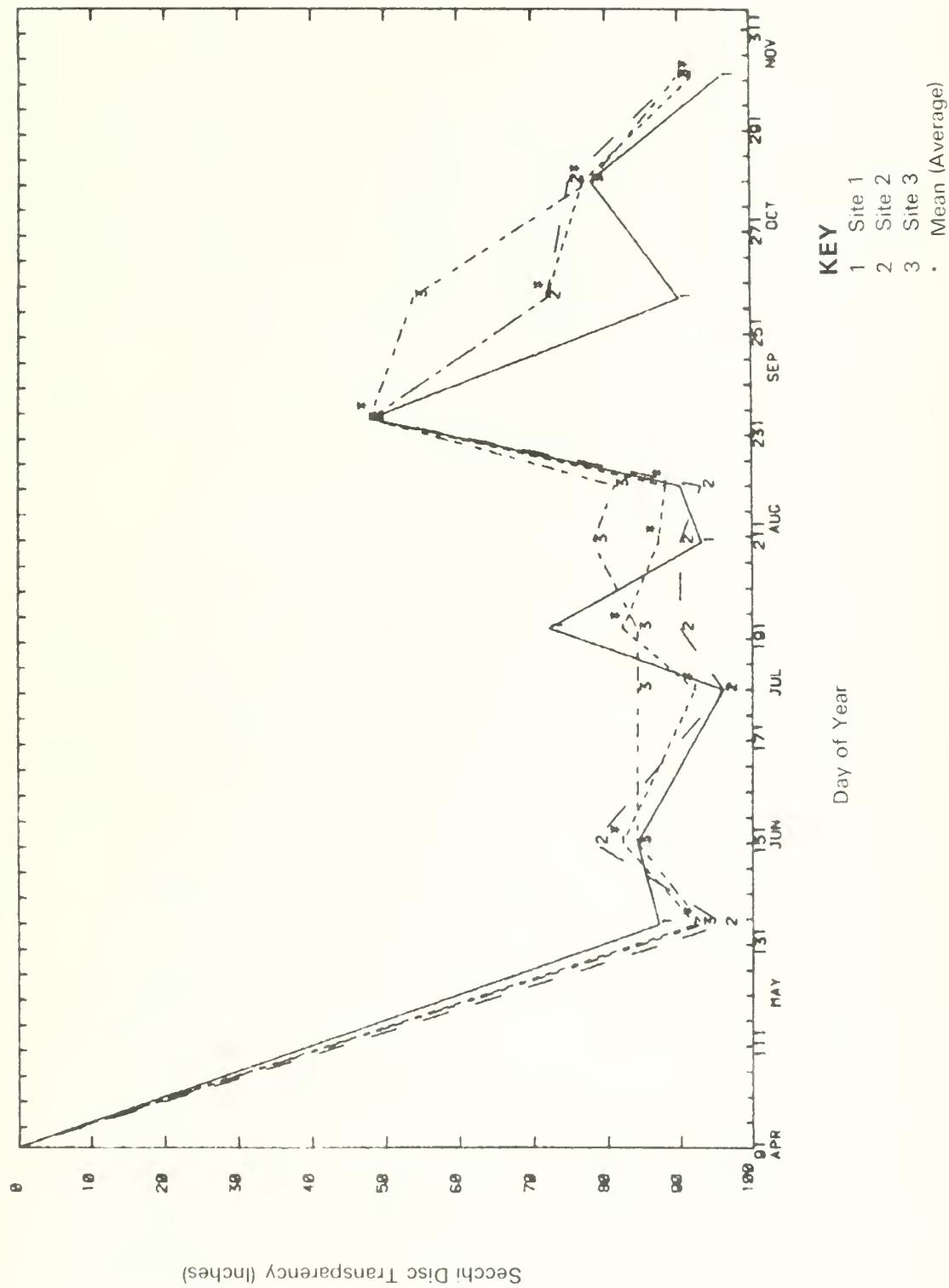


TABLE 4. FIELD OBSERVATIONS, LAKE SUNSET, LEE COUNTY, ILLINOIS.

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|---------|---|---|---|---|---|--|--|---|
| 7/15/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | grnsh-brn slight minimal minimal minimal algal mats no odor | grnsh-brn slight minimal minimal minimal algal mats no odor | grnsh-brn slight minimal minimal minimal algal mats no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | few clouds no rain calm warm N | many clouds heavy rain small cool | WATER LEVEL OF LAKE: RECREATIONAL USAGE: LAKE MANAGEMENT: ADDITIONAL COMMENTS: |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|---------|---|---|---|--|---|--|----------------------------------|---|
| 5/31/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | mod. green minimal slight minimal moderate none no odor | mod. green minimal slight minimal moderate none no odor | mod. green minimal slight minimal minimal none no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | clear no rain calm warm SW | clear no rain calm cool | WATER LEVEL OF LAKE: RECREATIONAL USAGE: LAKE MANAGEMENT: 50 lbs. fathead minnows ADDITIONAL COMMENTS: Forage |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|---------|---|--|--|--|---|-------------------------------------|-------------------------------------|---|
| 6/30/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | grnsh-brn minimal minimal minimal minimal none no odor | grnsh-brn minimal minimal minimal minimal none no odor | grnsh-brn minimal minimal minimal minimal none no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | overcast no rain calm warm | overcast no rain calm warm | WATER LEVEL OF LAKE: RECREATIONAL USAGE: LAKE MANAGEMENT: none ADDITIONAL COMMENTS: |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|---------|---|---|---|---|---|---------------------------------------|---------------------------------|---|
| 7/12/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | lt. green minimal slight minimal minimal none no odor | lt. green minimal slight minimal minimal none no odor | lt. green minimal slight minimal minimal none no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | clear no rain calm hot SE | clear no rain calm hot | WATER LEVEL OF LAKE: RECREATIONAL USAGE: LAKE MANAGEMENT: none ADDITIONAL COMMENTS: |

TABLE 4. FIELD OBSERVATIONS, LAKE SUNSET, LEE COUNTY, ILLINOIS.

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEDING 24 HOURS | OTHER COMMENTS |
|---------|---|--|--|--|---|--|--|--|
| 7/29/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | grn-brn minimal minimal minimal minimal none no odor | grn-brn minimal minimal minimal minimal none no odor | grn-brn minimal minimal minimal minimal none no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | overcast lt. rain ripple cool | WATER LEVEL OF LAKE: normal RECREATIONAL USAGE: fishing | LAKE MANAGEMENT: 7/23/81 Stocking with fathead minnows ADDITIONAL COMMENTS: Reason - for black crappie population |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEDING 24 HOURS | OTHER COMMENTS |
|--------|---|---|---|--|---|---|---|--|
| 8/9/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | grnsh-brn moderate minimal minimal minimal none no odor | grnsh-brn moderate minimal minimal minimal none no odor | grnsh-brn moderate minimal slight minimal none no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | overcast v. lt. rain ripple warm | WATER LEVEL OF LAKE: normal RECREATIONAL USAGE: row boating/canoeing | LAKE MANAGEMENT: 8/4 - 8/7 Mechanical harvesting of aquatic weeds ADDITIONAL COMMENTS: |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEDING 24 HOURS | OTHER COMMENTS |
|---------|---|--|--|---|---|----------------------------------|--|---|
| 8/22/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | grnsh-brn moderate minimal minimal moderate none no odor | grnsh-brn moderate minimal minimal moderate none no odor | grnsh-brn moderate minimal slight moderate none no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | clear no rain calm warm | WATER LEVEL OF LAKE: normal RECREATIONAL USAGE: fishing | LAKE MANAGEMENT: none ADDITIONAL COMMENTS: |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEDING 24 HOURS | OTHER COMMENTS |
|---------|---|--|---|--|---|----------------------------------|--|---|
| 9/15/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | grnsh-brn minimal minimal minimal minimal none no odor | grnsh-brn minimal minimal minimal slight none no odor | grnsh-brn minimal minimal slight slight none no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: | clear no rain calm warm | WATER LEVEL OF LAKE: normal RECREATIONAL USAGE: fishing | LAKE MANAGEMENT: none ADDITIONAL COMMENTS: |

TABLE 4. FIELD OBSERVATIONS, LAKE SUNSET, LEE COUNTY, ILLINOIS.

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|---------|---|---|---|---|--|---|------------------------------------|--|
| 10/8/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | grnsh-brn minimal minimal minimal minimal minimal none no odor | grnsh-brn minimal minimal minimal minimal minimal none no odor | grnsh-brn minimal minimal minimal minimal minimal none no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: OBSERVATIONS MADE BY: | clear no rain calm cool NW Lisa Brooks | clear no rain ripple cool | WATER LEVEL OF LAKE: RECREATIONAL USAGE: LAKE MANAGEMENT: 10/1/81 50 lbs. fthead minnows stocked ADDITIONAL COMMENTS: Fishery management recommended by D.O.C. |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|----------|---|---|---|---|--|--|----------------------------------|--|
| 10/29/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | grnsh-brn minimal minimal minimal minimal minimal none no odor | grnsh-brn minimal minimal minimal minimal minimal none no odor | grnsh-brn minimal minimal slight minimal none no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: OBSERVATIONS MADE BY: | clear no rain calm warm S.W. Lisa M. Brooks | clear no rain calm warm | WATER LEVEL OF LAKE: RECREATIONAL USAGE: LAKE MANAGEMENT: none ADDITIONAL COMMENTS: |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|------|---|--------|--------|--------|--|---------|---------------------|---|
| | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | | | | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: OBSERVATIONS MADE BY: | | | WATER LEVEL OF LAKE: RECREATIONAL USAGE: LAKE MANAGEMENT: ADDITIONAL COMMENTS: |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|------|---|--------|--------|--------|--|---------|---------------------|---|
| | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | | | | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: OBSERVATIONS MADE BY: | | | WATER LEVEL OF LAKE: RECREATIONAL USAGE: LAKE MANAGEMENT: ADDITIONAL COMMENTS: |

Relationship to Lake Use

Secchi disc transparency may indicate the potential of the lake for exhibiting water quality and use impairment problems. It may also help a fisherman locate the most likely fish habitat.

From the surface to between two and five times the Secchi disc depth can be considered the euphotic (lighted) zone of the lake; in this region there is enough light to allow plants to survive and produce oxygen by photosynthesis. This is also the zone of greatest fish activity. Waters below the euphotic zone can be expected to have little or no dissolved oxygen during the summer if the lake is thermally stratified (has layers of water of different temperatures). During this stratification period, fish will probably be limited to the euphotic or oxygenated zone of the lake.

The euphotic zone of Lake Sunset extended to the bottom at all three sites throughout the sampling period. As a result, submergent aquatic weed growth may be found throughout the lake and sufficient dissolved oxygen concentrations would be expected in the bottom waters.

SUMMARY AND RECOMMENDATIONS

Summary

Lake Sunset, a small, organizationally-owned recreational impoundment in northern Illinois, was sampled on ten dates between May 1 and October 31, 1981 under the Illinois EPA's Volunteer Lake Monitoring Program. Volunteer Lisa Brooks recorded Secchi disc transparency, total depth, and field observations at three sites and reported results to the Illinois EPA.

The average Secchi disc transparency of Lake Sunset (81.2 inches) ranked 9th of the 87 lakes monitored by volunteers in 1981 (rank 1 is clearest; 87 is least transparent). This average transparency was greater than the four feet minimum recommended for swimming by the Department of Public Health and was above average for Illinois lakes.

Lake Sunset is undergoing the process of eutrophication, as evidenced by transparency readings and field observations of algae and weed problems. Protection from further degradation is critical. If nutrient and sediment input were controlled, lake quality would probably improve; failure to control inputs will probably result in continued rapid eutrophication. Lake managers should identify sources of nutrient and sediment input and take steps to control them before the lake becomes further degraded.

Recommendations

Developing a management plan for a lake requires a comprehensive assessment of the lake and watershed and is beyond the scope of this project. However, some suggestions regarding lake management are presented below for consideration; their applicability to this lake would require further study. Alternative options not presented here may also apply.

Information on lake water levels is important for determining lake management strategies. Installation of a simple, but accurate, water level measuring device and frequent recording of lake water levels is recommended.

Lake managers should work with the Soil and Water Conservation District and the Soil Conservation Service to develop a procedure to identify and quantify non-point pollution source areas. This procedure should allow for the targeting of resources and programs to correct the identified problems.

Installation of Resource Management Systems in source areas of the watershed may reduce nutrient and sediment transport to the lake. Stabilization of the lake shoreline by riprap or some other means may also reduce sediment input. Nutrient contributions from septic tanks, fertilization of lawns, and waterfowl should also be investigated and minimized.

Continuation of the in-lake management program underway should be helpful. Aeration-destratification may promote a shift in algal populations to species other than the problem-causing blue-greens and improve fish habitat and fishing. Mechanical harvesting to control nuisance growths of aquatic weeds is a recommended procedure.

Continued monitoring is recommended for Lake Sunset. Consistent data gathered over a period of years is necessary to more fully document and evaluate water quality trends, identify problems, and evaluate lake/watershed management strategies.

REFERENCES

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Illinois Environmental Protection Agency. 1982. Volunteer Lake Monitoring, 1981. A Cooperative Citizen - Illinois Environmental Protection Agency project. Monitoring Unit; Division of Water Pollution Control, Illinois EPA, Springfield, Illinois.

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DS:jab/sp3891C

GLOSSARY*

acre-foot - the volume of water required to cover one acre to a depth of one foot and equal to 0.3258 million gallons; a unit of storage capacity obtained by multiplying surface area (in acres) by average depth (in feet).

aeration-destratification - the addition of air to the water through mechanical means to increase the dissolved oxygen content of the bottom waters of lakes by eliminating thermal stratification and homogenizing the entire water column.

aerobic - conditions characterized by the presence of oxygen.

algae - one-celled or colonial photosynthetic plants (usually microscopic), found suspended in water or attached to damp rocks or other substrates.

algal bloom - a large number of planktonic algae, which often turns the water green and may produce objectionable scums and odors; a condition in which algae cloud the water noticeably.

ambient - existing condition or level at the time and place.

ammonia - a colorless, gaseous, alkaline compound which is a decompositional end product of nitrogen-containing organic matter; its importance in fresh water is associated with its toxicity to aquatic organisms and its use as a nutrient for aquatic plant growth.

anaerobic - conditions characterized by the absence of oxygen.

anoxic - without oxygen.

aquatic - growing or living in water; pertaining to water.

aquatic weeds - larger plants easily visible to the naked eye which are submergent, floating or emergent in the water.

artificial - man-made; constructed.

average depth - mean depth of a lake, calculated by dividing the volume (storage capacity) by the surface area.

backwater (or river backwater) - water impoundment located along the side of a stream or river which may flood periodically or have a direct connection to the stream at all times.

blue-green algae - a group of one celled or colonial plants of the phylum Cyanophyta, which live in water or damp places and reflect a blue to dark green tint; most often responsible for nuisance algal blooms with scum and odors.

borrow pit - a water impoundment formed by removal of earth for fill construction in the making of roads, dikes, bridges and levees

bottomland lake - natural water impoundment located in a river floodplain

circulation period - mixing period for a lake; period of time in which the entire lake volume is not thermally stratified and is totally mixed by wind action.

condition - the overall quality of the lake for supporting general use

detritus - finely divided organic and inorganic settleable material suspended in the water

diatoms - a group of one-celled or colonial algae living in water or damp places which are characterized by the presence of yellow-green or brown pigments and cell walls which contain silica and are composed of two halves (valves), one overlapping the other like the top and bottom of a pill box

drainage area - watershed; the land surface surrounding the lake which contributes water via surface runoff to the lake

ecology - the study of the relationship of organisms to their environment

emergent - a rooted aquatic plant with parts normally extending above the water surface

epilimnion - upper, relatively warm, circulating zone of water in a thermally stratified lake

euphotic zone - region of a lake where light penetration is sufficient to maintain photosynthesis; its lower limit is generally two to five times the Secchi disc transparency.

eutrophic - waters which are rich in plant nutrients and capable of supporting high biological productivity; USEPA defines a eutrophic lake as one that exhibits any of the following characteristics: biomass accumulations of primary producers (algal blooms and excessive aquatic weeds); rapid organic or inorganic sedimentation and shallowing; or seasonal dissolved oxygen deficiencies in the bottom waters and subsequent shift in species composition of aquatic fauna to forms that can tolerate lower concentrations of oxygen.

eutrophication - lake aging through nutrient enrichment and sedimentation.

fertile - waters rich in plant nutrients.

glacial lake - body of standing water formed by glacial action.

green algae - a group of one-celled or colonial plants of the phylum Chlorophyta, which live in water or damp areas and reflect a greenish tint.

hydrogen sulfide - a gaseous compound produced under anaerobic conditions which has a rotten egg smell.

hypolimnion - lower, relatively cold, noncirculating zone in a thermally stratified lake.

impairment - that which damages or negatively impacts the present or potential use of a body of water.

impoundment - a body of standing water constructed by artificial means or formed by nature.

in-lake treatment or control techniques - methods to limit the availability of pollutants already in the lake or to accelerate their outflow; and various physical, chemical and biological approaches for managing the consequences of degradation and enhancing the usability of the lake without controlling the source of the degradation.

iron - an essential micronutrient, which is considered objectionable in water supplies because it can cause taste and odor problems and stain laundry.

lake - a body of standing water 6.0 acres or more in surface area (as defined by the Illinois Department of Conservation).

lake code - an eight-digit combination of letters and numbers used to identify a lake in the computer.

limnologist - aquatic ecologist; one who studies the physical, chemical, and biological aspects of lakes.

limnology - the study of the ecology of inland lakes.

littoral - shoreward region of a body of water.

macrophyte - large plant of macroscopic size (easily visible to the naked eye).

management - non-structural measures designed to enhance the quality and usability of a lake.

manganese - an essential micronutrient, which is considered objectionable at high concentrations because it can cause taste and odor problems.

maximum (max) - highest (largest) value observed in a data set.

maximum depth - depth of deepest point in a lake.

mean - a statistical term for average, calculated by totalling the values and dividing by the number of observations.

mean depth - the volume of a lake divided by its surface area; average depth.

mesotrophic - waters intermediate in character between oligotrophic and eutrophic; moderately well supplied with plant nutrients and capable of supporting moderate biological productivity.

minimum (min) - smallest (lowest) value observed in a data set.

mixing period - circulation period of a lake; period of time in which the lake is not thermally stratified and is totally mixed by wind action.

nitrogen - an element which is an essential plant nutrient and is one of the principal elemental constituents of proteins.

nonpoint pollution - pollution from diffuse sources (e.g., agriculture, forestry operations, mining, construction) for which a specific point of discharge cannot be readily identified.

nutrient - any chemical element, ion or compound that is required by an organism for the continuation of growth, reproduction and other life processes; nitrogen and phosphorus are usually growth limiting factors for aquatic plants.

oligotrophic - waters with low concentrations of plant nutrients and hence capable of supporting little biological productivity.

organizational impoundment - body of standing water owned, leased or maintained by an organization of six or more members (as defined by the Illinois Department of Conservation).

phosphorus - an element which is an essential plant nutrient and plays a vital role in the energy transfer during cell metabolism.

photosynthesis - the process by which green plants use the sun's energy to convert dioxide and water into chemical energy (carbohydrates, fats, and proteins).

phytoplankton - microscopic plants (algae) that drift passively in open water regions of lakes and rivers.

plankton - the community of microscopic plants and animals that drift passively in open water regions of lakes and rivers.

point source pollution - pollution emanating from a discharge point such as a pipe which can be specifically identified (e.g., sewage treatment plants, manufacturing plants).

pollution - any substance which makes another unclean or impure.

pond - small body of standing water less than 6.0 acres in surface area (as defined by the Illinois Department of Conservation).

potable - of quality for drinking.

private impoundment - body of standing water privately owned or leased with no fee charged for use (as defined by the Illinois Department of Conservation).

production - total amount of living matter produced in a lake per unit time.

productivity - rate at which organic material (and energy) is produced and transferred through organisms in an ecosystem; standing crop of organisms that can be supported.

protection - pollution abatement or control; measures to prevent pollution from entering a lake, including methods to stop the pollution at its source or to treat it before it reaches the lake.

public access - publicly owned contiguous land or easements providing any member of the public the same or equivalent opportunity to enjoy privileges and benefits of the lake as any other member of the public or as any resident around the lake.

public impoundment - body of standing water owned and maintained by a governmental agency (excluding the Illinois Department of Conservation) that have public access.

public water supply - used as a municipal water supply for domestic needs.

Resource Management Systems - best management practices for the control and abatement of nonpoint pollution; a combination of agricultural practices which reduce soil erosion and/or increase water retention.

restoration - structural measures designed to return a lake to its original condition (e.g., dredging to original depth).

reservoir - a watershed impoundment artificially constructed by damming of a stream.

resuspend - cause to be suspended in the water.

river basin - drainage area for a large river.

seasonal - over a period of time (seasonal).

Secchi disc - an eight-inch diameter weighted metal plate painted black and white in alternating quadrants which is lowered into the water on a calibrated line to measure the transparency or clarity of the water.

Secchi disc depth - the depth into the water to which a black and white circular disc can be seen when viewed from the surface; a measure of water transparency or its ability to allow vertical light penetration.

sediment - the solid materials (particulate matter) transported by, suspended in or deposited from, water; includes fragmentary material that originates from weathering of rock, chemical and biochemical precipitants and decomposed organic material such as humus.

sediment-related turbidity - muddiness; cloudiness or opaqueness of the water caused by suspended sediment.

sedimentation - deposition of organic and/or inorganic particulate matter.

sedimentation surveys - measurement of the amount of sediment deposited in a water body.

segments - a subwatershed within a large river basin.

spatial - differences over an area.

standard deviation (Std. Dev.) - a statistical term to describe the variability of the data around the mean (average); if the magnitude of the standard deviation is "small" relative to the mean, then most of the values are close to the mean in magnitude and the data has little variability (is relative uniform); if the standard deviation is large in magnitude relative to the mean, then the data is more variable.

state impoundment - a body of standing water owned or leased and maintained by the Illinois Department of Conservation.

storage capacity - volume of water an impoundment can hold; often expressed in acre-feet, million gallons, and cubic meters.

submergent - an aquatic plant that lives and grows entirely below the surface of the water.

succession - in ecology, the progressive change of plant and animal life in an area.

suspended sediment - the sediment that at any given time is maintained in suspension by current or as a colloid.

suspended solids - particulate material that at any given time is maintained in suspension by current or as a colloid; total suspended solids are all suspended particulate material, volatile and non-volatile, organic and inorganic; volatile suspended solids is that suspended particulate material, generally organic in nature, which undergoes combustion at a temperature of 600°C.

suspension - a heterogenous mixture in which the particles of one substance are kept dispersed by agitation.

thermal stratification - the layering of the water in a lake due to different densities as a function of temperature; the layers are the epilimnion (upper), metalimnion or thermocline (middle), and the hypolimnion (lower).

thermocline - metalimnion; the middle layer of water in a thermally stratified lake in which temperature decreases rapidly with increasing depth.

transparency - ability to allow light penetration and be seen through; clarity.

trophic state - the degree of eutrophication of a lake; the rate of primary biological production it is capable of supporting.

turbid - cloudy, opaque, murky, dirty-looking; containing suspensoids (organic or inorganic) which interfere with light penetration.

turbidity - amount of scattering of light caused by material suspended in the water.

use impairment - that which damages or negatively impacts the present or potential use of a body of water.

water quality - the suitability of the water for supporting various uses.

water retention time - water residence time; period of time a mass of water remains in an impoundment.

watershed - drainage area; the land surface surrounding the lake which contributes water, via surface runoff, to the lake; the total or contributing watershed area is the total draining to the lake, including the lake surface area; the immediate or net watershed is the portion of the total watershed (free of lakes or sloughs) from which direct, unimpeded surficial runoff drains to the lake.

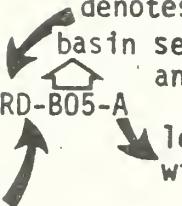
zooplankton - animal portion of the community of suspended or floating organisms which drift passively with the water currents.

ABBREVIATIONS AND SYMBOLS

av - average
brn - brown
brnsh-grn - brownish-green
grn-brn - green-brown
grnsh-brn - greenish-brown
lt - light
max - maximum value
min - minimum value
mod - moderately
std. dev. - standard deviation
v - very

Explanatory example of lake code:

Anderson Lake


RD-B05-A
basin code
basin segment and sub-segment
letter denoting specific lake within a basin segment

D = Illinois River Basin

*Definitions of items in sense used in text

DS:sp,6207a,1-8

UNIVERSITY OF ILLINOIS-URBANA
551.482V889X C002
VOLUNTEER LAKE MONITORING PROGRAM SPRIN
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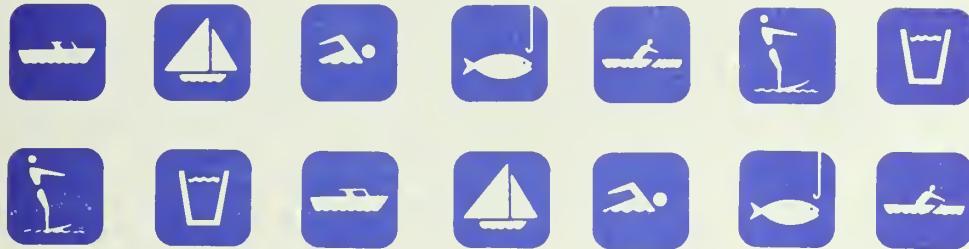
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ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF WATER POLLUTION CONTROL
2200 CHURCHILL ROAD
SPRINGFIELD, ILLINOIS 62706



NATURAL HISTORY MUSEUM

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1981 VOLUNTEER LAKE

MONITORING PROGRAM REPORT

Lake Summerset / STEPHENSON + WINNEBAGO Co.



1981 VOLUNTEER LAKE MONITORING PROGRAM REPORT
FOR
LAKE SUMMERSET, STEPHENSON/WINNEBAGO COUNTIES, ILLINOIS

A Cooperative Citizen -
Illinois Environmental Protection Agency
Project

May, 1982
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706

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This is one of 87 reports prepared for lakes in the 1981 Volunteer Lake Monitoring Program. It represents the coordinated effort of many individuals.

Illinois EPA's Ambient Monitoring Unit, Planning Section, Division of Water Pollution Control, under the direction of Kenneth R. Rogers, was responsible for the design and implementation of the program, as well as preparation of this report. Substantial assistance was provided by the Agency's Public Participation Section supervised by Gloria Craven.

Program coordination was provided by Donna Sefton for the Illinois EPA's Ambient Monitoring Unit and Carol Beim for the Public Participation Section.

Volunteers were trained by Public Participation Coordinators Carol Beim, Bob Hagele, William Hammel, Patrick McCarthy, Vanessa Musgrave, and Dawn Wrobel. Lake maps were prepared by J. W. Hammel and Bob Hagele. Lake assessment summaries were prepared by Patrick McCarthy.

Assessment and monitoring information was provided by approximately 140 volunteers throughout the state.

Data handling was performed by John Little, Jill Hardin, Marilyn Budd, Lori Whalen, Cora Stockton, and Karen Janssen. Data analyses were performed and tabular and graphical outputs obtained by John Little using programs developed for the Tektronix desk top computer terminal by Dr. David J. Schaeffer and Vladimir Chernomordikov.

Donna Sefton, Howard Essig, John Little, John Lesnak, Carol Beim, and Bob Hagele wrote portions of the lake reports. Reports were edited by Planning Section and Public Participation staff, particularly Marilyn Budd and Mary Anderson. The contributions of Robert Clarke and Thomas Davenport are recognized.

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INTRODUCTION

A cooperative volunteer lake monitoring effort was initiated by the Illinois EPA in 1981 as part of an overall self-help, service program being developed for lakes. In addition to expanding the Agency's lakes data base with information on present water quality and trends, the program was designed to involve citizens in learning about a lake so they could make more informed decisions regarding its use, protection, and enhancement.

Citizens selected a lake they were concerned about and were trained to measure water clarity or transparency by recording the depth to which a Secchi disc (an eight-inch diameter metal plate painted black and white in alternating quadrants) was visible. They also measured total depth and recorded field observations from a boat at three sites on their chosen lake. Readings were to be taken twice a month from May through October and reported to the Agency on special data forms. The Secchi disc, data forms, and postage paid envelopes were provided by the Agency. Volunteers were required to have a boat with an anchor to perform the monitoring.

Approximately 140 volunteers participated in monitoring 87 lakes in 1981. The sampling data were computerized to facilitate analyses and preparation of tables and graphs for reports. A statewide report entitled "Volunteer Lake Monitoring, 1981", summarized all the data for the volunteer lakes. Individual reports were also prepared for each of the 87 lakes monitored by volunteers in 1981.

BACKGROUND

Lake Summerset is a 301 acre impoundment owned by the Lake Summerset Association. The lake, which is located in Stephenson and Winnebago Counties, 3 miles northwest of Durand, Illinois was constructed by damming Otter Creek in 1969-1970. It has a maximum depth of 40 feet, an average depth of 18 feet and a storage capacity of 5,418 acre-feet (Table 1).

Lake Summerset serves as a recreational lake, primarily used for fishing, swimming, power boating, waterskiing, rowboating, canoeing, and sailboating. Access is available to members and their guests only.

The watershed drainage of Lake Summerset is estimated to be 60 percent row crops. The lake shoreline is completely residential.

Aquatic weeds are considered to be a moderate problem in Lake Summerset. Pasture or grassland runoff, cropland runoff and industrial runoff are cited as potential pollution sources.

Assessment information for Lake Summerset was provided by Dennis Bokemeier, manager of the Lake Association. Monitoring was performed by Dennis Bokemeier and Mike Ware. Secchi disc depth, total depth and field observations were recorded at three sites (located in Figure 1) on eleven dates in 1981.

TABLE 1. LAKE ASSESSMENT SUMMARY, LAKE SUMMERSSET, STEPHENSON/WINNEBAGO COUNTIES, ILLINOIS (RP-A06-I).

I. GENERAL INFORMATION

River Basin: Rock
Segment: A06

Ownership: Lake Summerset Association

Surface Area (Acres): 301
Watershed Area (Acres): 4500
Maximum Depth (Feet): 40
Average Depth (Feet): 18
Storage Capacity (Acre/Feet): 5418
Inflowing Stream(s): Otter Creek
Outflowing Stream(s): Otter Creek
Water Retention Time: 1.806 years
Lake Type: dammed stream
Year Constructed: 1969 - 1970

II. USAGE

Public Access: no

Lake Usage:

Potable Water Supply: none
Industrial Water Supply: none
Agricultural Water Supply: none
Cooling Water: none

Recreation:

Fishing: heavy
Swimming: moderate
Power Boating: heavy
Row Boating or Canoeing: moderate
Sailboating: heavy
Camping: none
Picnicking: light
Waterfowl Hunting: none
Waterfowl Observation: none
Other: waterskiing - heavy

Recreational Facilities:
2 beach areas, 2 boat launches,
many parks

Shoreline Usage (Percent):

Urban (Including Streets):
Residential (Including Lawns): 100%
Golf Courses:
Pasture or Grassland:
Woodland:
Row Crops:
Wetland:
Other:

Watershed Usage (Percent):

Urban:
Residential:
Golf Courses:
Pasture or Grassland: 40%
Woodland:
Row Crops: 60%
Wetland:
Other:

III. WATER QUALITY AND PROBLEMS

General Water Quality: excellent

Fishing: excellent

Conditions and Extent:

Suspended Sediment:
Deposition of Sediment: minimal
Algal Blooms: slight
Aquatic Weeds: moderate
Taste and/or Odor: minimal
Water Level Fluctuation: minimal
Fishkills: minimal
Other:

IV. CAUSES OF WATER QUALITY PROBLEMS

Potential Pollution Sources:

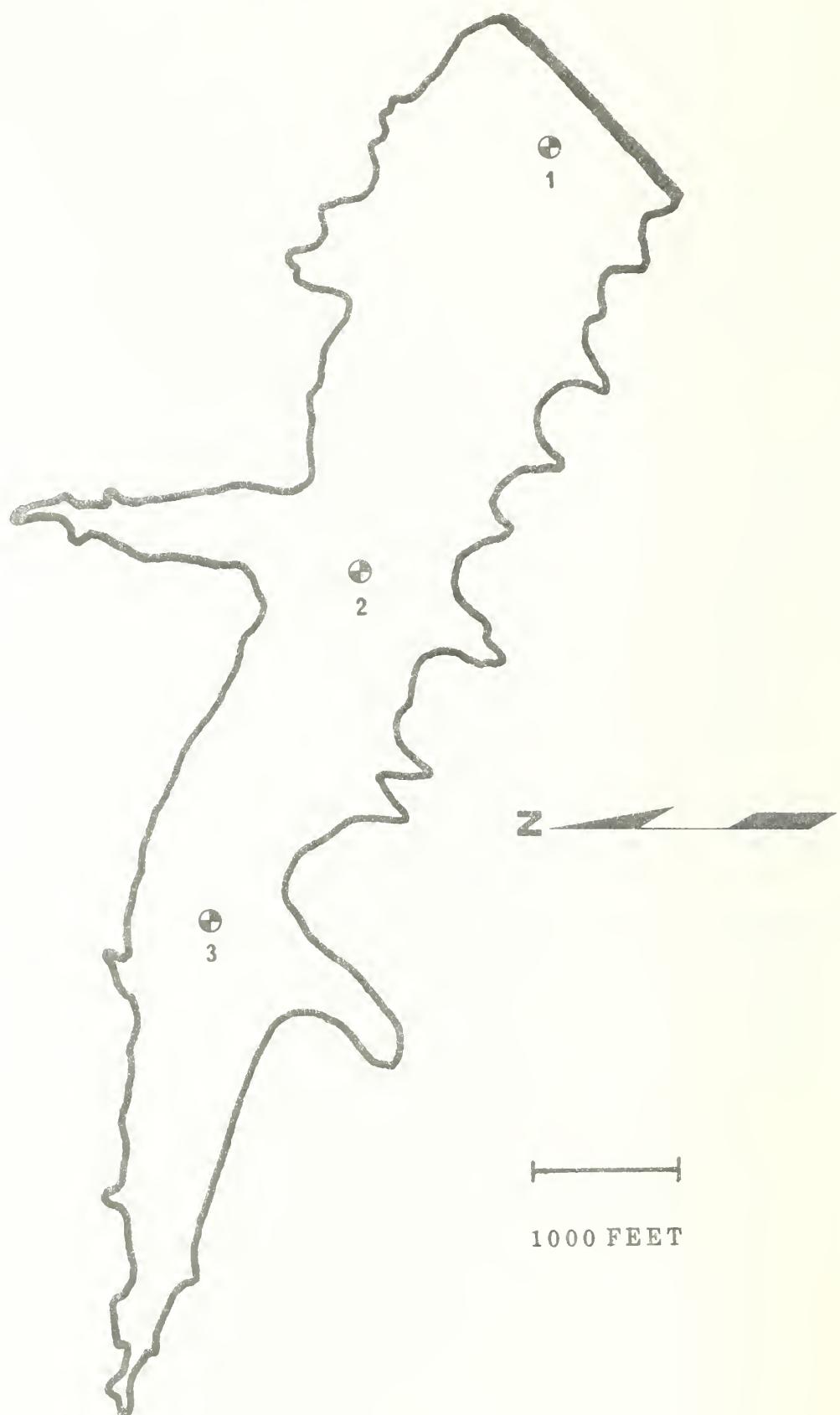
Sewage Treatment Plant Effluent:
Industrial Discharge:
Urban Storm Drainage:
Septic Tanks:
Pasture or Grassland Runoff: yes
Cropland Runoff:
Feedlot Runoff:
Construction Site Runoff:
Fertilizer or Pesticides from
Lawns/Golf Courses:
Orchards:
Forestry Operations Runoff:
Mining:
Waterfowl:
Sediment in Lake:
Other: possible cheese factory run-off.

V. LAKE MANAGEMENT

Comments: Aquatic weeds - treat seasonally (Cyclone
plus diquat, aquathol-K); purchased a weed harvester
machine in 1980.

Information Supplied By Dennis Bokemeier (1981);

SUMMERSET LAKE
STEPHENSON & WINNEBAGO COUNTIES



RESULTS AND DISCUSSION

In this section, monitoring results will be presented for the lake and compared to those for other lakes in the volunteer program. Then spatial (within lake) and seasonal differences in transparency will be examined and related to field observations. Results will also be discussed in terms of lake uses. For an explanation of unfamiliar terms or concepts presented here, refer to the report "Volunteer Lake Monitoring, 1981", Section IV "Understanding Illinois' Lakes."

The Secchi monitoring data for Lake Summerset are summarized in Table 2 and plotted in Figure 2. Total depth data are provided in Table 3, while field observations are summarized in Table 4.

Transparency of Lake Summerset

The average Secchi disc transparency of Lake Summerset was 66.6 inches. Lake Summerset ranked number 12 when the average transparencies of the volunteer lakes were ranked from clearest (number 1 at 137.8 inches) to least transparent (number 87 at 7.3 inches). This average transparency was greater than the four feet minimum recommended for swimming by the Illinois Department of Public Health (1976) and was above average for Illinois lakes.

Spatial and Seasonal Differences in Transparency

The Secchi disc transparency of Lake Summerset ranged from a minimum of 10 inches at Site 3 on September 24 to a maximum of 132 inches at Site 2 on June 30.

The clarity of Lake Summerset was relatively uniform at Sites 1 and 2, while it was much lower at Site 3. Average transparencies were 71.5 inches, 75.7 inches, and 52.5 inches at Sites 1, 2, and 3, respectively. Secchi readings were below the four feet minimum recommended for swimming on two of the eleven sampling dates at Sites 1 and 2 and on three sampling dates at Site 3. The lower transparencies at Site 3 were probably related, in part, to the shallow depth of the site (average depth 5.7 feet) and resultant stirring up of sediment by wind and wave activity. It may also reflect the input of nutrients and sediment in the vicinity.

There were seasonal trends in the transparency of Lake Summerset. Lowest transparencies were generally found in late summer and were probably the result of algae blooms.

Field observations indicate that the transparency of Lake Summerset was influenced primarily by the presence of algae. A green water color was observed and algae colonies were noted on several sampling dates. Moderate to large amounts of aquatic weeds were observed at Site 3 and near the shore in June and July. This probably reflects the shallow

TABLE 2

SECCHI DISC TRANSPARENCY (INCHES) SUMMERSSET/STEPHENSON COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

| DATE | SITE 1 | SITE 2 | SITE 3 | MEAN | STD DEV |
|--------|--------|--------|--------|-------|---------|
| 85/ 15 | 75.0 | 71.0 | 66.0 | 70.7 | 4.6 |
| 85/ 30 | 49.6 | 54.0 | 48.0 | 47.3 | 7.0 |
| 85/ 24 | 78.0 | 70.0 | 54.0 | 70.0 | 13.0 |
| 85/ 30 | 126.0 | 132.0 | 72.0 | 110.6 | 33.0 |
| 87/ 12 | 125.0 | 120.0 | 72.0 | 104.0 | 27.7 |
| 88/ 11 | 68.0 | 62.0 | 69.0 | 64.0 | 6.0 |
| 88/ 5 | 12.0 | 24.0 | 22.0 | 16.5 | 6.4 |
| 88/ 24 | 48.0 | 36.0 | 19.0 | 31.3 | 19.4 |
| 88/ 30 | 68.0 | 66.0 | 42.0 | 54.0 | 18.4 |
| 88/ 8 | 84.0 | 96.0 | 66.0 | 82.0 | 15.1 |
| 88/ 27 | 84.0 | 92.0 | 66.0 | 88.0 | 12.5 |

SUMMARY STATISTICS

| SITES | LAKE |
|----------|-------|
| MEAN | 71.5 |
| STD DEV | 33.2 |
| MIN | 12.0 |
| MAX | 126.0 |
| AV DEPTH | 14.8 |
| | 26.0 |
| | 5.7 |

-1 = missing value

See glossary for explanation of Summary Statistics.

TABLE 3

DEPTH OF SITE (FEET) SUMMERSSET/STEPHENSON COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

| DATE | SITE 1 | SITE 2 | SITE 3 | MEAN | STD DEV |
|--------|--------|--------|--------|------|---------|
| 85/ 15 | 13.0 | 23.5 | 8.0 | 14.2 | 8.8 |
| 85/ 30 | 14.5 | 26.0 | 5.5 | 15.3 | 10.3 |
| 86/ 24 | 14.0 | 28.5 | 6.0 | 16.2 | 11.4 |
| 86/ 30 | 14.0 | 26.0 | 6.0 | 15.3 | 10.1 |
| 87/ 12 | 14.5 | 22.0 | 6.0 | 14.2 | 8.0 |
| 88/ 11 | 15.0 | 28.5 | 6.0 | 16.5 | 11.3 |
| 88/ 5 | 14.0 | 25.0 | 6.0 | 15.0 | 9.5 |
| 89/ 24 | 16.0 | 26.5 | 4.5 | 15.7 | 11.0 |
| 89/ 30 | 17.5 | 31.0 | 6.0 | 18.2 | 12.5 |
| 89/ 8 | 14.0 | 23.0 | 5.5 | 14.2 | 8.8 |
| 89/ 27 | 16.5 | 27.0 | 5.5 | 16.3 | 10.8 |

SUMMARY STATISTICS

| SITES | LAKE |
|----------|------|
| MEAN | 14.8 |
| STD DEV | 1.3 |
| MIN | 13.0 |
| MAX | 17.5 |
| AV DEPTH | 14.6 |

-1 = missing value

See glossary for explanation of Summary Statistics

FIGURE 2

SECCHI DISC TRANSPARENCY (INCHES) SUMMERSSET/STEPHENSON COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

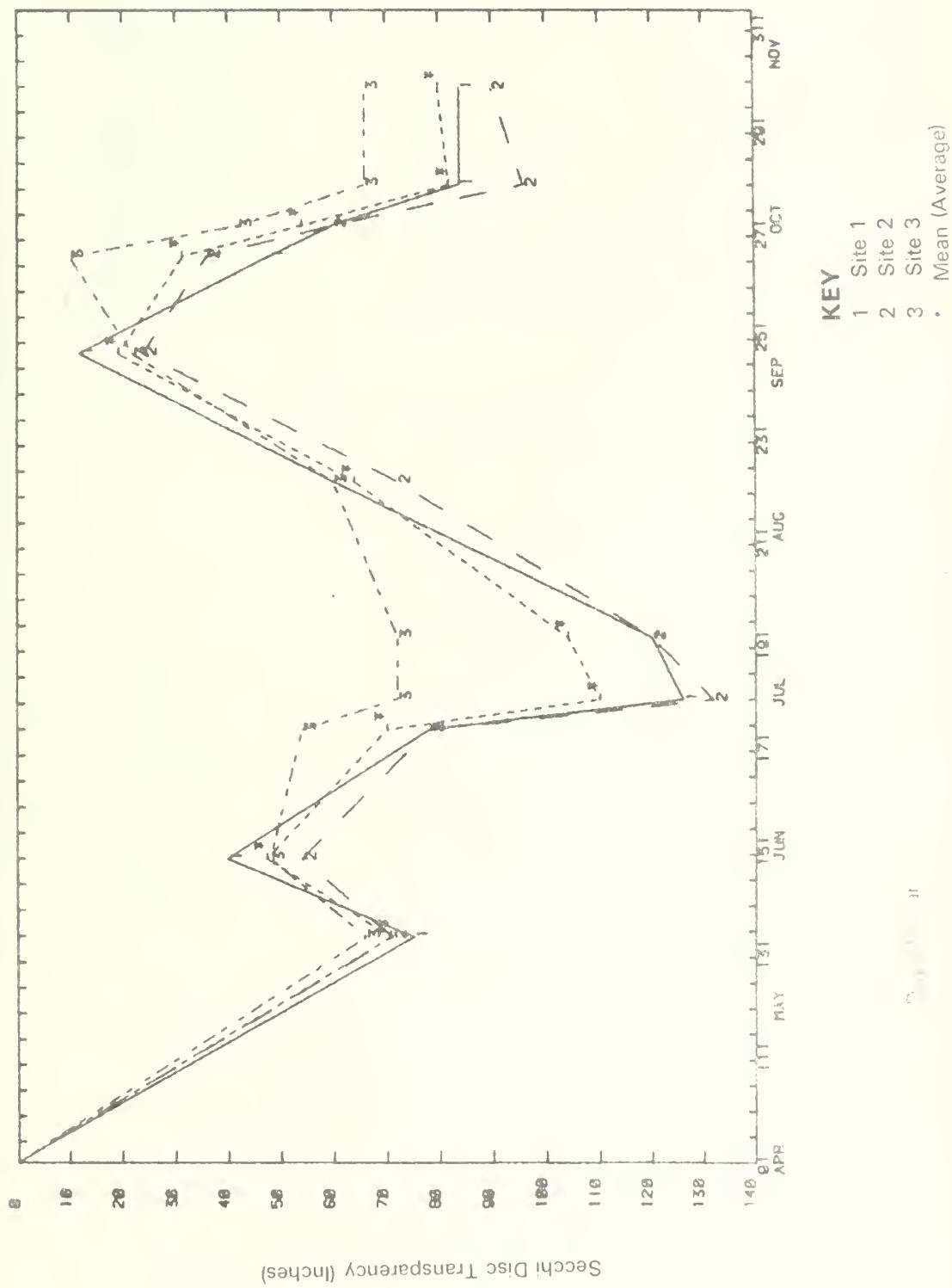


TABLE 4. FIELD OBSERVATIONS, LAKE SUMMERSSET, STEPHENSON/WINNEBAGO COUNTY, ILLINOIS.

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|---------|---|---|---|--|--|---|---|--|
| 5/15/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | mod. green minimal minimal minimal minimal minimal dandelion seeds no odor | mod. green minimal minimal minimal minimal minimal dandelion seeds no odor | mod. green minimal slight minimal minimal minimal dandelion seeds no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: OBSERVATIONS MADE BY: | clear no rain calm warm NW Dennis Bokemeier Mike Ware | overcast lt. rain calm cool W | WATER LEVEL OF LAKE: RECREATIONAL USAGE: bathing LAKE MANAGEMENT: none ADDITIONAL COMMENTS: |
| 5/30/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | mod. green slight moderate minimal minimal minimal algal mats waterfowl no odor | mod. green minimal minimal minimal minimal minimal none | lt. green minimal minimal minimal minimal slight none | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: OBSERVATIONS MADE BY: | many clouds no rain ripple warm NW Dennis Bokemeier | clear no rain small hot W | WATER LEVEL OF LAKE: RECREATIONAL USAGE: boating, waterskiing, sailing Swimming LAKE MANAGEMENT: none ADDITIONAL COMMENTS |
| 6/24/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | clear minimal minimal minimal minimal none | lt. green minimal slight minimal minimal moderate none | lt. green minimal moderate minimal moderate moderate none | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: OBSERVATIONS MADE BY: | hazy no rain small warm SW Dennis Bokemeier | clear heavy rain ripple warm | WATER LEVEL OF LAKE: RECREATIONAL USAGE: power boating, waterskiing, sailing LAKE MANAGEMENT: 6/10/81 Cuttine-Plus lake shoreline ADDITIONAL COMMENTS: Treated for algae and coontail |
| 6/30/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | clear minimal minimal minimal minimal slight algal mats no odor | clear minimal minimal minimal minimal slight none | clear minimal moderate moderate large alg. mats duckweed no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: OBSERVATIONS MADE BY: | clear no rain calm warm NE Dennis Bokemeier | clear no rain ripple hot W | WATER LEVEL OF LAKE: RECREATIONAL USAGE: boating, waterskiing, sailing LAKE MANAGEMENT: none ADDITIONAL COMMENTS: weed harvester |

TABLE 4. FIELD OBSERVATIONS, LAKE SUMMERSSET, STEPHENSON/WINNEBAGO COUNTY, ILLINOIS.

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEDING "24 HOURS | OTHER COMMENTS |
|---------|---|---|---|--|--|---|---|--|
| 7/12/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | lt. green minimal minimal minimal moderate algal mats no odor | lt. green slight minimal minimal large moderate algal mats fishy | lt. green slight large large moderate algal mats no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: OBSERVATIONS MADE BY: | few clouds no rain ripple hot S Dennis Bokemeier | clear no rain moderate hot SE | WATER LEVEL OF LAKE: normal RECREATIONAL USAGE: fishing, swimming, power boating, waterskiing, row boating canoeing, sailing LAKE MANAGEMENT: 7/8/81 Cutrine-Plus $\frac{1}{4}$ of lake, upper west end ADDITIONAL COMMENTS: algae |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEDING "24 HOURS | OTHER COMMENTS |
|---------|---|---|--|--|--|--|---|---|
| 8/11/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | lt. green minimal minimal minimal moderate algal mats no odor | mod. green minimal slight minimal minimal algal mats no odor | mod. green slight moderate minimal minimal algal mats waterfowl no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: OBSERVATIONS MADE BY: | many clouds no rain ripple warm SW Dennis Bokemeier | clear no rain ripple warm W | WATER LEVEL OF LAKE: normal RECREATIONAL USAGE: fishing, swimming, power boating, waterskiing LAKE MANAGEMENT: 8/10/81 - 8/11/81 Cutrine-Plus in bay area ADDITIONAL COMMENTS: algae |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEDING "24 HOURS | OTHER COMMENTS |
|--------|---|--|---|--|--|---|--|--|
| 9/5/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | very green moderate moderate moderate moderate waterfowl no odor | mod. green slight minimal minimal minimal waterfowl no odor | very green moderate minimal slight minimal waterfowl* | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: OBSERVATIONS MADE BY: | few clouds no rain calm warm NW Dennis Bokemeier | hazy no rain ripple warm S | WATER LEVEL OF LAKE: above normal 2" RECREATIONAL USAGE: fishing, swimming, power boating, waterskiing, row boating or canoeing sailing LAKE MANAGEMENT: none ADDITIONAL COMMENTS: |

* Coontail

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEDING "24 HOURS | OTHER COMMENTS |
|---------|---|---|---|--|--|--|---|--|
| 9/24/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | mod. green moderate moderate moderate moderate none no odor | mod. green moderate moderate moderate moderate none no odor | very green large large large large slight leaves | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: OBSERVATIONS MADE BY: | hazy no rain ripple warm SE Mike Ware | few clouds no rain ripple warm NW | WATER LEVEL OF LAKE: normal RECREATIONAL USAGE: none LAKE MANAGEMENT: none ADDITIONAL COMMENTS: |

TABLE 4. FIELD OBSERVATIONS, LAKE SUMMERS, STEPHENSON/WINNEBAGO COUNTY, ILLINOIS, 1981.

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|---------|---|--|--|--|--|--|--|--|
| 9/30/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | mod. green minimal slight minimal minimal none no odor | mod. green minimal slight minimal minimal none no odor | mod. green minimal slight minimal minimal leaves no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: E | clear no rain small warm E | overcast no rain moderate warm E | WATER LEVEL OF LAKE: normal RECREATIONAL USAGE: fishing, power boating, sailing LAKE MANAGEMENT: none ADDITIONAL COMMENTS: |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|---------|---|---|--|--|---|--|--|---|
| 10/8/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | lt. green slight minimal minimal minimal none no odor | lt. green slight minimal minimal minimal waterflow no odor | clear slight minimal minimal minimal waterflow no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: N.W. | clear no rain ripple warm N.W. | clear no rain ripple warm W. | WATER LEVEL OF LAKE: normal RECREATIONAL USAGE: fishing LAKE MANAGEMENT: none ADDITIONAL COMMENTS: |

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|----------|---|---|---|---|--|--|--|--|
| 10/27/81 | WATER COLOR: SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | mod. green moderate slight minimal minimal leaves no odor | mod. green moderate slight minimal minimal leaves no odor | clear moderate minimal minimal waterflow leaves no odor | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: * | clear no rain ripple cool W. | clear no rain calm cool E. | WATER LEVEL OF LAKE: fishing RECREATIONAL USAGE: fishing LAKE MANAGEMENT: none ADDITIONAL COMMENTS: |

* Clippings, clumps of sediment, waterfowl, leaves

| DATE | OBSERVATION | SITE 1 | SITE 2 | SITE 3 | WEATHER AT LAKE | PRESENT | PRECEEDING 24 HOURS | OTHER COMMENTS |
|------|---|--------|--------|--------|--|---------|---------------------|---|
| | WATER COLOR; SEDIMENT: ALGAE: WEEDS AT SAMPLE SITE: WEEDS NEAR SHORE: OTHER SUBSTANCES: ODOR: | | | | CLOUD COVER: PRECIPITATION: WAVES: AIR TEMPERATURE: WIND DIRECTION: [] | | | WATER LEVEL OF LAKE: RECREATIONAL USAGE: LAKE MANAGEMENT: ADDITIONAL COMMENTS: |

nature of these areas and/or nutrient input in the vicinity. The lake is routinely treated with Cutrine plus Diquat and Aquathol-K for aquatic weed control. A weed harvesting machine was purchased in 1980.

Relationship to Lake Use

Secchi disc transparency may indicate the potential of the lake for exhibiting water quality and use impairment problems. It may also help a fisherman locate the most likely fish habitat.

Generally, from the surface to between two and five times the Secchi disc depth can be considered the euphotic (lighted) zone of the lake; in this region there is enough light to allow plants to survive and produce oxygen by photosynthesis. This is also the zone of greatest fish activity. Waters below the euphotic zone can be expected to have little or no dissolved oxygen during the summer if the lake is thermally stratified (has layers of water of different temperatures). During this stratification period, fish will probably be limited to the euphotic or aerobic (oxygenated) zone of the lake.

The lower limit of the euphotic zone of Lake Summerset (estimated at twice the Secchi depth) ranged from 2.0-21.0 feet at Site 1, from 4.0-22.0 feet at Site 2, from 1.7-12.0 feet at Site 3. Since Sites 1 and 2 on Lake Summerset are deep enough to thermally stratify and had euphotic zones that were generally less than the total depths, low dissolved oxygen values would be expected in the bottom waters of these sites.

In the absence of dissolved oxygen, undesirable substances such as hydrogen sulfide, ammonia, methane, phosphorus, iron, and manganese may accumulate in the bottom waters. When these substances are distributed throughout the lake during mixing periods, they can trigger nuisance algal blooms, aquatic weed growth, taste and odor, and other water quality problems.

SUMMARY AND RECOMMENDATIONS

Summary

Lake Summerset, an organizationally-owned recreational impoundment in northern Illinois, was sampled on eleven dates between May 1 and October 31, 1981 under the Illinois EPA's Volunteer Lake Monitoring Program. Volunteers Dennis Bokemeier and Mike Ware recorded Secchi disc transparency, total depth, and field observations at three sites and reported results to the Illinois EPA.

The average Secchi disc transparency of Lake Summerset (66.6 inches) ranked 12th of the 87 lakes monitored by volunteers in 1981 (rank 1 is clearest; 87 is least transparent). This average transparency was greater than the four feet minimum recommended for swimming by the Department of Public Health, and was above average for Illinois lakes.

Lake Summerset is deep enough to thermally stratify during the summer. Since the lower limit of its euphotic zone (estimated at twice the Secchi depth) is generally less than the total depth, low bottom water dissolved oxygen values, associated water quality problems, and limitation of fish habitat may be expected during summer stratification.

Lake Summerset is undergoing the process of eutrophication, as evidenced by transparency readings and field observations of algae, weed, and sediment problems. Protection from further degradation is critical. If nutrient and sediment input were controlled, lake quality would probably improve; failure to control inputs will probably result in continued rapid eutrophication. Lake managers should identify sources of nutrient and sediment input and take steps to control them before the lake becomes further degraded.

Recommendations

Developing a management plan for a lake requires a comprehensive assessment of the lake and watershed and is beyond the scope of this project. However, some suggestions regarding lake management are presented below for consideration; their applicability to this lake would require further study. Alternative options not presented here may also apply.

Information on lake water levels is important for determining lake management strategies. Installation of a simple, but accurate, water level measuring device and frequent recording of lake water levels is recommended.

Lake managers should work with the Soil and Water Conservation District and the Soil Conservation Service to develop a procedure to identify and quantify non-point pollution source areas. This procedure should allow for the targeting of resources and programs to correct the identified problems.

Installation of Resource Management Systems in source areas of the watershed may reduce nutrient and sediment transport to the lake. Stabilization of the lake shoreline by riprap or some other means may also reduce sediment input. Nutrient contributions from fertilization of lawns should also be investigated and minimized.

In-lake management may also warrant consideration. Aeration-destratification to prevent dissolved oxygen depletion may promote a shift in algal populations to species other than the problem-causing blue-greens, reduce the need for copper sulfate, and improve fishing. Harvesting of aquatic weeds should be continued.

Continued monitoring is recommended for Lake Summerset. Consistent data gathered over a period of years is necessary to document and evaluate water quality trends, identify problems, and evaluate lake/watershed management strategies.

REFERENCES

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DS:jab/sp3873C

GLOSSARY*

acre-foot - the volume of water required to cover one acre to a depth of one foot and equal to 0.3258 million gallons; a unit of storage capacity obtained by multiplying surface area (in acres) by average depth (in feet).

aeration-destratification - the addition of air to the water through mechanical means to increase the dissolved oxygen content of the bottom waters of lakes by eliminating thermal stratification and homogenizing the entire water column.

aerobic - conditions characterized by the presence of oxygen.

algae - one-celled or colonial photosynthetic plants (usually microscopic), found suspended in water or attached to damp rocks or other substrates.

algal bloom - a large number of planktonic algae, which often turns the water green and may produce objectionable scums and odors; a condition in which algae cloud the water noticeably.

ambient - existing condition or level at the time and place.

ammonia - a colorless, gaseous, alkaline compound which is a decompositional end product of nitrogen-containing organic matter; its importance in fresh water is associated with its toxicity to aquatic organisms and its use as a nutrient for aquatic plant growth.

anaerobic - conditions characterized by the absence of oxygen.

anoxic - without oxygen.

aquatic - growing or living in water; pertaining to water.

aquatic weeds - larger plants easily visible to the naked eye which are submergent, floating or emergent in the water.

artificial - man-made; constructed.

average depth - mean depth of a lake, calculated by dividing the volume (storage capacity) by the surface area.

backwater (or river backwater) - water impoundment located along the side of a stream or river which may flood periodically or have a direct connection to the stream at all times.

blue-green algae - a group of one celled or colonial plants of the phylum Cyanophyta, which live in water or damp places and reflect a blue to dark green tint; most often responsible for nuisance algal blooms with scum and odors.

borrow pit - a water impoundment formed by removal of earth for fill construction in the making of roads, dikes, bridges and levees

bottomland lake - natural water impoundment located in a river floodplain

circulation period - mixing period for a lake; period of time in which the entire lake volume is not thermally stratified and is totally mixed by wind action.

condition - the overall quality of the lake for supporting general use

detritus - finely divided organic and inorganic settleable material suspended in the water

diatoms - a group of one-celled or colonial algae living in water or damp places which are characterized by the presence of yellow-green or brown pigments and cell walls which contain silica and are composed of two halves (valves), one overlapping the other like the top and bottom of a pill box

drainage area - watershed; the land surface surrounding the lake which contributes water via surface runoff to the the lake

ecology - the study of the relationship of organisms to their environment

emergent - a rooted aquatic plant with parts normally extending above the water surface

epilimnion - upper, relatively warm, circulating zone of water in a thermally stratified lake

euphotic zone - region of a lake where light penetration is sufficient to maintain photosynthesis; its lower limit is generally two to five times the Secchi disc transparency.

eutrophic - waters which are rich in plant nutrients and capable of supporting high biological productivity; USEPA defines a eutrophic lake as one that exhibits any of the following characteristics: biomass accumulations of primary producers (algal blooms and excessive aquatic weeds); rapid organic or inorganic sedimentation and shallowing; or seasonal dissolved oxygen deficiencies in the bottom waters and subsequent shift in species composition of aquatic fauna to forms that can tolerate lower concentrations of oxygen.

eutrophication - lake aging trhough nutrient enrichment and sedimentation.

fertile - waters rich in plant nutrients.

glacial lake - body of standing water formed by glacial action.

green algae - a group of one-celled or colonial plants of the phylum Chlorophyta, which live in water or damp areas and reflect a greenish tint.

hydrogen sulfide - a gaseous compound produced under anaerobic conditions which has a rotten egg smell.

hypolimnion - lower, relatively cold, noncirculating zone in a thermally stratified lake.

impairment - that which damages or negatively impacts the present or potential use of a body of water.

impoundment - a body of standing water constructed by artificial means or formed by nature.

in-lake treatment or control techniques - methods to limit the availability of pollutants already in the lake or to accelerate their outflow; and various physical, chemical and biological approaches for managing the consequences of degradation and enhancing the usability of the lake without controlling the source of the degradation.

iron - an essential micronutrient, which is considered objectionable in water supplies because it can cause taste and odor problems and stain laundry.

lake - a body of standing water 6.0 acres or more in surface area (as defined by the Illinois Department of Conservation).

lake code - an eight-digit combination of letters and numbers used to identify a lake in the computer.

limnologist - aquatic ecologist; one who studies the physical, chemical, and biological aspects of lakes.

limnology - the study of the ecology of inland lakes.

littoral - shoreward region of a body of water.

macrophyte - large plant of macroscopic size (easily visible to the naked eye).

management - non-structural measures designed to enhance the quality and usability of a lake.

manganese - an essential micronutrient, which is considered objectionable at high concentrations because it can cause taste and odor problems.

maximum (max) - highest (largest) value observed in a data set.

maximum depth - depth of deepest point in a lake.

mean - a statistical term for average, calculated by totalling the values and dividing by the number of observations.

mean depth - the volume of a lake divided by its surface area; average depth.

mesotrophic - waters intermediate in character between oligotrophic and eutrophic; moderately well supplied with plant nutrients and capable of supporting moderate biological productivity.

minimum (min) - smallest (lowest) value observed in a data set.

mixing period - circulation period of a lake; period of time in which the lake is not thermally stratified and is totally mixed by wind action.

nitrogen - an element which is an essential plant nutrient and is one of the principal elemental constituents of proteins.

nonpoint pollution - pollution from diffuse sources (e.g., agriculture, forestry operations, mining, construction) for which a specific point of discharge cannot be readily identified.

nutrient - any chemical element, ion or compound that is required by an organism for the continuation of growth, reproduction and other life processes; nitrogen and phosphorus are usually growth limiting factors for aquatic plants.

oligotrophic - waters with low concentrations of plant nutrients and hence capable of supporting little biological productivity.

organizational impoundment - body of standing water owned, leased or maintained by an organization of six or more members (as defined by the Illinois Department of Conservation).

phosphorus - an element which is an essential plant nutrient and plays a vital role in the energy transfer during cell metabolism.

photosynthesis - the process by which green plants use the sun's energy to convert dioxide and water into chemical energy (carbohydrates, fats, and proteins).

phytoplankton - microscopic plants (algae) that drift passively in open water regions of lakes and rivers.

plankton - the community of microscopic plants and animals that drift passively in open water regions of lakes and rivers.

point source pollution - pollution emanating from a discharge point such as a pipe which can be specifically identified (e.g., sewage treatment plants, manufacturing plants).

pollution - any substance which makes another unclean or impure.

pond - small body of standing water less than 6.0 acres in surface area (as defined by the Illinois Department of Conservation).

potable - of quality for drinking.

private impoundment - body of standing water privately owned or leased with no fee charged for use (as defined by the Illinois Department of Conservation).

production - total amount of living matter produced in a lake per unit time.

productivity - rate at which organic material (and energy) is produced and transferred through organisms in an ecosystem; standing crop of organisms that can be supported.

protection - pollution abatement or control; measures to prevent pollution from entering a lake, including methods to stop the pollution at its source or to treat it before it reaches the lake.

public access - publicly owned contiguous land or easements providing any member of the public the same or equivalent opportunity to enjoy privileges and benefits of the lake as any other member of the public or as any resident around the lake.

public impoundment - body of standing water owned and maintained by a governmental agency (excluding the Illinois Department of Conservation) that have public access.

public water supply - used as a municipal water supply for domestic needs.

Resource Management Systems - best management practices for the control and abatement of nonpoint pollution; a combination of agricultural practices which reduce soil erosion and/or increase water retention.

restoration - structural measures designed to return a lake to its original condition (e.g., dredging to original depth).

reservoir - a watershed impoundment artificially constructed by damming of a stream.

resuspend - cause to be suspended in the water.

river basin - drainage area for a large river.

seasonal - over a period of time (seasonal).

Secchi disc - an eight-inch diameter weighted metal plate painted black and white in alternating quadrants which is lowered into the water on a calibrated line to measure the transparency or clarity of the water.

Secchi disc depth - the depth into the water to which a black and white circular disc can be seen when viewed from the surface; a measure of water transparency or its ability to allow vertical light penetration.

sediment - the solid materials (particulate matter) transported by, suspended in or deposited from, water; includes fragmentary material that originates from weathering of rock, chemical and biochemical precipitants and decomposed organic material such as humus.

sediment-related turbidity - muddiness; cloudiness or opaqueness of the water caused by suspended sediment.

sedimentation - deposition of organic and/or inorganic particulate matter.

sedimentation surveys - measurement of the amount of sediment deposited in a water body.

segments - a subwatershed within a large river basin.

spatial - differences over an area.

standard deviation (Std. Dev.) - a statistical term to describe the variability of the data around the mean (average); if the magnitude of the standard deviation is "small" relative to the mean, then most of the values are close to the mean in magnitude and the data has little variability (is relative uniform); if the standard deviation is large in magnitude relative to the mean, then the data is more variable.

state impoundment - a body of standing water owned or leased and maintained by the Illinois Department of Conservation.

storage capacity - volume of water an impoundment can hold; often expressed in acre-feet, million gallons, and cubic meters.

submergent - an aquatic plant that lives and grows entirely below the surface of the water.

succession - in ecology, the progressive change of plant and animal life in an area.

suspended sediment - the sediment that at any given time is maintained in suspension by current or as a colloid.

suspended solids - particulate material that at any given time is maintained in suspension by current or as a colloid; total suspended solids are all suspended particulate material, volatile and non-volatile, organic and inorganic; volatile suspended solids is that suspended particulate material, generally organic in nature, which undergoes combustion at a temperature of 600°C.

suspension - a heterogenous mixture in which the particles of one substance are kept dispersed by agitation.

thermal stratification - the layering of the water in a lake due to different densities as a function of temperature; the layers are the epilimnion (upper), metalimnion or thermocline (middle), and the hypolimnion (lower).

thermocline - metalimnion; the middle layer of water in a thermally stratified lake in which temperature decreases rapidly with increasing depth.

transparency - ability to allow light penetration and be seen through; clarity.

trophic state - the degree of eutrophication of a lake; the rate of primary biological production it is capable of supporting.

turbid - cloudy, opaque, murky, dirty-looking; containing suspensoids (organic or inorganic) which interfere with light penetration.

turbidity - amount of scattering of light caused by material suspended in the water.

use impairment - that which damages or negatively impacts the present or potential use of a body of water.

water quality - the suitability of the water for supporting various uses.

water retention time - water residence time; period of time a mass of water remains in an impoundment.

watershed - drainage area; the land surface surrounding the lake which contributes water, via surface runoff, to the lake; the total or contributing watershed area is the total draining to the lake, including the lake surface area; the immediate or net watershed is the portion of the total watershed (free of lakes or sloughs) from which direct, unimpeded surficial runoff drains to the lake.

zooplankton - animal portion of the community of suspended or floating organisms which drift passively with the water currents.

ABBREVIATIONS AND SYMBOLS

av - average
brn - brown
brnsh-grn - brownish-green
grn-brn - green-brown
grnsh-brn - greenish-brown
lt - light
max - maximum value
min - minimum value
mod - moderately
std. dev. - standard deviation
v - very

Explanatory example of lake code:

Anderson Lake

RD-B05-A
D = Illinois River Basin

denotes lake as opposed to stream
basin segment and sub-segment
letter denoting specific lake within a basin segment
basin code

*Definitions of items in sense used in text

DS:sp,6207a,1-8

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